DELAY DISCOUNTING AND SOCIAL POLICY ISSUES

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The present study used a delay discounting framework to study decisions about six social policy issues and one monetary outcome. For outcomes that nearly all participants discounted, social policies were discounted significantly more than money. A similar result was observed when analyzing all outcomes using data only from participants who discounted all outcomes. Factor analyses, however, indicated that discounting of social policies outcomes was not independent of discounting money. When data from nondiscounters were included in the analyses, results indicated that participants placed the most value on money and the least value on expanding legalized abortion. Further, a factor analysis suggested that the issues of abortion, gay marriage, and potentially affirmative action were valued differently than the other outcomes. This separation appeared to be mediated by political party affiliation and church attendance. The present results highlight the potential value of studying how individuals discount delayed outcomes pertaining to social issues, but also reveal the potential complexities of doing so.
Key words: social policy issues, delay discounting, factor analysis, college students

Delay discounting is said to occur when an individual is willing to accept a lesser amount of an outcome or commodity in order to obtain it sooner (e.g., $90 today) rather than having to wait longer to receive the full amount (e.g., $100 six months from today). Within psychology, delay discounting can be traced to early work in what is known as delay of gratification (Rotter, 1954), and it has emerged to become a much-researched phenomenon. The interest in delay discounting has grown for several reasons. For one, the rate at which individuals discount delayed consequences has been linked to such psychological disorders as substance abuse (e.g., Kirby, Petry, & Bickel, 1999; see Madden & Bickel, 2010, for a review), pathological gambling (e.g., Dixon, Marley, & Jacobs, 2003; see Petry, 2005, for a review), and attention-deficit/hyperactivity disorder (e.g., Williams, 2010). Another reason for the interest is that researchers can use rates of discounting as a

metric of the value of an outcome (e.g., Weatherly, Derenne, & Terrell, 2010) because rates of discounting vary inversely with the magnitude of the outcome (e.g., Chapman, 1996; Thaler, 1981).

In terms of the study of discounting, however, one could claim that psychologists are actually quite late to the party. There is a large literature on discounting in the field of economics, much of which is based on principles that date back to Ramsey (1928). One major difference between the two fields is that while psychologists largely agree that discounting can be described by a hyperbolic function over time (see Madden & Bickel, 2010, for an overview), most economists assume that the decrease is exponential (e.g., Gollier, 2009), although some economists have made arguments for hyperbolic discounting (e.g., Henderson & Bateman, 1995; Pearce, Groom, Hepburn, & Koundouri, 2003).

As in the field of economics, much of the work on discounting in psychology has involved one particular commodity: a hypothetical amount of money (e.g., Dixon et al., 2003; Dixon, Jacobs, & Sanders, 2006; Yi, Mitchell, & Bickel, 2010). But discounting can be applied to other outcomes and, in fact, a large literature continues to emerge in the field of economics on the discounting of environmental policies (e.g., Li & Lofgren, 2000; Newell & Pizer, 2003). Psychologists have also started to measure discounting of a wide range of outcomes as well as to try to understand how the discounting of these outcomes relates to the discounting of money. For instance, Hardisty and Weber (2009) measured rates of delay discounting for both hypothetical monetary and environmental outcomes (i.e., improvement in air quality or increases in garbage). Their results suggested that financial and environmental outcomes were discounted similarly. The authors concluded that the results were potentially good news for public-policy makers because they suggest that policy makers could use a single rate of discounting when formulating monetary and environmental policy decisions.

Although different commodities are sometimes discounted similarly, there is considerable evidence that this is not always the case. Differences can be found as a function of group. For instance, Johnson, Bickel, and Baker (2007) reported that smokers differed from nonsmokers in how they discounted delayed hypothetical monetary rewards, but not in how they discounted personal-health consequences. Differences can also be found within groups. For instance, although Hardisty and Weber (2009) did not find differences in the discounting rates of monetary and environmental outcomes, they did find that rates of discounting health outcomes differed from those for monetary and environmental outcomes. By comparison, others have found within-subject differences in the discounting of consumable (e.g., food) and nonconsumable (e.g., money) commodities (Odum & Rainaud, 2003), at least when it comes to delay discounting (vs. probability discounting; Estle, Green, Myerson, & Holt, 2007).

In a recent study from our laboratory (Weatherly, Terrell, & Derenne, 2010), participants completed a delay discounting task involving five separate commodities. One group was given questions concerning monetary amounts, cigarettes, obtaining one's ideal body image, and finding one's perfect mate, while a second group was given questions concerning monetary amounts, medical treatment, retirement income, and education legislation. A factor analysis was conducted on each data set, and in each case, the results indicated a two-factor solution, suggesting that there are at least two

"domains" of commodities. That is, if one identifies the rate at which a commodity (e.g., money) is discounted, then that rate is predictive of discounting rates of other commodities within that particular domain (e.g., cigarettes). However, that same rate would not be predictive of discounting rates of commodities belonging to a different domain (e.g., one's perfect mate).

The present study utilized a delay discounting framework to study the subjective values that individuals place on a sample of social policy issues. Specifically, we studied the issues of abortion legislation, affirmative action, funding for child day care workers, funding for teaching young girls math and science, legalization of gay marriage, and prosecution of domestic-violence offenders. To our knowledge, no research has been conducted on the discounting of these social policies. Beyond the absence of prior research, there are also theoretical reasons to study how such outcomes are discounted. From an economical standpoint, future generations are historically likely to be wealthier than the current one (Pearce et al., 2003). Thus, it may be easier for future generations to affordably institute some social policies than it is for the current generation. Next, any social policy issue faces an uncertain political future. That is, the long-term benefits of instituting a social policy require that future policy makers continue to implement the policy rather than changing or repealing it (see Pearce et al., 2003, for a discussion). For example, Logue and Anderson (2001) showed that experienced university administrators were more likely than new or inexperienced administrators to take a smaller budget increase immediately rather than waiting for a promised larger budget increase in several years (i.e., they displayed greater delay discounting), presumably because the experienced administrators had learned that administrative promises made today are not likely to be fulfilled years from now. For these reasons, one might predict that individuals may discount social issues to a greater degree than they would a hypothetical sum of money that they are, presumably, guaranteed.

By employing a delay discounting framework to study these issues, we could potentially make several determinations. One was how these social policy outcomes are discounted relative to one another, which can be determined by directly comparing discount rates between issues. A second was whether these issues fall within a single or multiple domains, which can be determined via factor analysis. This determination would inform us as to whether individuals discount some social policy outcomes independently of others. A third determination was how these social policies are discounted relative to a non-social-policy outcome, such as winning a hypothetical sum of money ($100,000). Previous research (e.g., Hardisty & Weber, 2009) has suggested that discounting of environmental issues may not differ from discounting of monetary outcomes. However, as noted previously, there may be reasons for expecting social policies to be discounted more steeply than hypothetical sums of money. Furthermore, by including the discounting rates for money in the factor analyses, it was also possible to determine whether the discounting of money is independent of the discounting of some or all of the social policy outcomes.

Lastly, a delay discounting framework may allow for an indirect assessment of value placed on these particular issues/commodities. Phrased differently, because the rate of discounting varies directly with the magnitude of the consequence (i.e., the magnitude effect; cf. Chapman, 1996; Thaler, 1981), the rate should be correlated with the value of the outcome to the individual.

Individuals who do not want a given outcome, even if there is no delay to receiving it, are not discounting and, as such, do not inform us as to the process of discounting. Even so, their responses attest to the complete lack of value they place on that particular outcome. By also analyzing these extreme values in the present study, one could also potentially identify how participants subjectively valued the different social policy outcomes included in our sample.

Method

Participants

The participants were 199 undergraduate students (54 males, 145 females) enrolled in a psychology course at the University of North Dakota. The mean age of the participants was 21.2 years (SD = 2.9 years). The sample was racially homogeneous, with 94% (187) of the participants self-identifying as Caucasian and the remaining 6% self-identifying as American Indian (3), African American (3), Asian (3), or "Other" (3). As for political affiliation, 22.6% (45) of the participants reported being a Democrat, 28.6% (57) reported being a Republican, 16.1% (32) reported being an Independent, 31.2% (62) selected "Other/Don't know," and 1.5% (3) did not provide a response. Religiosity was measured through self-report of regular church attendance, with 28.1% (56) of the participants reporting that they regularly attended church services and 71.9% (143) reporting that they did not regularly attend church services.

Materials and Procedure

Participants completed the study in their psychology course (i.e., in a group setting) and received extra course credit for doing so. Participation was voluntary, and individuals who did not wish to participate were free to leave the room. No record was kept as to the number of participants who chose not to participate or their reasons for doing so.

Participants received a questionnaire packet that contained several items. One was an informed-consent cover sheet that informed them of the risks and benefits of the study as approved by the Institutional Review Board at the University of North Dakota. Another was a demographic information sheet that requested the information reported above. Finally, there was a paper-and-pencil delay discounting task that included seven different commodities or outcomes.

The outcomes were a federal law expanding access to abortion, a federal law mandating affirmative action, a federal law nationalizing child care, an increase in the prosecution rate of perpetrators of domestic violence, a state law recognizing gay marriage, a local increase in funding for girls' math and science education, and winning $100,000. With the exception of the monetary amount, these particular outcomes were chosen because we had anticipated that our sample of convenience would largely be comprised of female respondents. Thus, we wanted to maximize the likelihood that participants would find the social policy outcomes relevant. The exact wording of the questions can be found in the Appendix.

Participants were asked five questions about each outcome, with the

difference across questions being the delay to obtaining the full amount (6 months, 1 year, 3 years, 5 years, or 10 years). The shortest delays were longer than those used in many studies of delay discounting (e.g., Beck & Triplett, 2009; Weatherly, Terrell, & Derenne, 2010). However, several of the outcomes used in the present investigation involved changes in legislation, and legislative changes do not typically occur over the course of days or weeks, but rather months or years. Therefore, our shortest delay was 6 months.

Questions pertaining to each particular outcome appeared on separate pages in the questionnaire packet. Prior to the initiation of the study, the order of outcomes was randomly determined (and is represented by the order in which they are displayed in the Appendix). The order of delays was also determined randomly, independently for each separate outcome. The resulting order of outcomes and delays was used for all participants.

The present study employed a multiple-choice delay discounting task similar to that employed by Beck and Triplett (2009). That is, participants were asked to indicate the percentage of the outcome they would accept immediately rather than waiting for the specified delay. The percentages provided as choices appeared in increments of 5%. In addition, the extreme values (i.e., 100% or 0%) were anchored by written statements (e.g., "willing to wait" or "I don't want the money") to aid participants' interpretation of the question.

Our delay discounting task differed from that used by Beck and Triplett (2009) in several respects. Those researchers used small increments in amount between choices at the extremes and large increments around the midpoint of the scales. They also did not provide qualitative anchors at the endpoints. We chose equal increments of 5% because, although we lost the sensitivity to measure changes less than 5% as a result, we did not want to provide more choices at different points within the scale because we believed doing so might bias how participants responded (i.e., providing more potential answers at some points of the scale might draw the participants' attention to those areas and implicitly suggest that the "correct" answer was in that area of the scale). We chose to provide qualitative statements as anchors because previous research from our laboratory (Weatherly, Derenne, & Terrell, 2010; Weatherly, Terrell, & Derenne, 2010) has found that a certain proportion of participants appear to misinterpret the task (e.g., indicating that they would accept $0 today rather than waiting 5 years for $100,000), and we believed that these anchors would minimize misinterpretation and also limit the choice of the extremes only to when that was a participant's actual preference. This latter point was important because one might assume that some respondents would hold strong views on some of the social policy outcomes and identify one of the extreme values regardless of the length of the delay.

Data Analysis

The delay discounting data were analyzed by calculating the area under the curve (AuC) created by the indifference points provided by the respondents using the following equation (Myerson, Green, & Warusawitharana, 2001):

$$\Sigma\, (x_{n+1} - x_n) \times (y_n + y_{n+1})/2. \tag{1}$$

With Equation 1, AuC is calculated by summing the areas of the trapezoids created by the indifference points across the different delays. In the present study, *n* was calculated in months. When employing Equation 1, one can typically assume that the value of the outcome is at 100% when there is no delay. However, for the present study, we did not make this assumption because if a respondent held a view that was completely against a particular outcome (e.g., abortion) at each delay, it would seem reasonable to assume that they would also be against it when there was no delay. AuC values were therefore calculated starting with the first data point (i.e., the first delay) for all participants. As suggested by Myerson et al. (2001), the delays and values were normalized, and as a result, the value of the AuC could range from 0.0 to 1.0. Smaller values of AuC indicate that the participant has discounted that outcome to a greater extent than a participant with a larger AuC value. Phrased differently, if a participant was willing to wait for the full amount of an outcome regardless of the delay, then the AuC value was 1.0. On the other hand, if the outcome held no value to the participant (i.e., the participant did not want any of the commodity regardless of the delay), then the AuC value was 0.0.

There are other techniques for analyzing delay discounting data. Perhaps the most popular alternative is to fit a hyperbolic equation (Mazur, 1987) to the indifference points. Another technique is to add an exponent to the hyperbolic equation. There is an ongoing debate as to which technique is superior (Beck & Triplett, 2009; Killeen, 2009; Smith & Hantula, 2008). Our decision to use AuC (and Equation 1) as the dependent measure was somewhat independent of this debate.

Equation 1 does not make an assumption as to what form delay discounting data will take. A hyperbolic equation, on the other hand, assumes that discounting of a commodity will be hyperbolic in nature. Delay discounting requires participants to be willing to engage in a trade-off between the amount of a commodity and the time of its receipt (e.g., Dixon et al., 2003). Some have used an even stricter definition: The participant must be willing to select a lesser amount of the commodity as the delay to the full amount is increased (e.g., Beck & Triplett, 2009). In the present study, however, we anticipated that a certain proportion of the participants would provide responses that resulted in extreme AuC values (i.e., 0.0 or 1.0). In such instances, a hyperbolic equation would not fit the data. However, these extreme values had interpretable meaning under the present procedure and thus were included in some, but not all, of the analyses.

Direct comparisons of AuC values for individual commodities were made via a one-way repeated measures analysis of variance (ANOVA). When appropriate, post hoc Tukey HSD tests were employed. For the initial analyses, significance was set at $p < .05$. Because several analyses were conducted using certain data, statistical significance for all subsequent analyses was set at $p < .01$.

Factor analyses were conducted by first performing a principal components analysis (PCA) using PASW Statistics Version 17.0. The criteria used for determining the number of factors to rotate were eigenvalues greater than 1.0, inspection of the scree plot, and logical item loadings (Cattell, 1966; Tabachnick & Fidell, 2007). The data were then subjected to a principal axis factoring (PAF) analysis specifying the number of factors identified in the PCA. For both the PCA and PAF, a varimax rotation was employed in

instances in which multiple factors were identified. The purpose of these analyses was to determine how delay discounting of the seven different commodities varied in relation to one another.

Results

Table 1 presents the frequency of extreme responses for the different commodities. Overall, participants were nearly equally likely to fully discount social policy outcomes (AuC = 0.0) as they were to not discount them at all (AuC = 1.0). However, the frequency of such occurrences differed across social policies, with the vast majority of those fully discounting expanded access to abortion. For this reason, we decided to run three separate sets of analyses. The first was on the commodities for which the vast majority of participants displayed non-zero AuC values[1]: nationalizing child care, increasing prosecution of domestic-violence offenders, increasing funding for teaching girls math and science, and winning $100,000. This set of analyses allowed us to compare how participants discounted social policy outcomes and money when all commodities had some value.

Table 1
The Frequency of Observing the Complete Discounting (AuC = 0.0) or the Complete Absence of Discounting (AuC = 1.0) for Each Outcome (n = 199)

	AuC	
Outcome	0.0	1.0
Abortion	77	16
Affirmative action	13	23
Child care	0	7
Domestic violence	3	16
Gay marriage	30	29
Sciences classes	3	11
Won $100,000	0	26
Total	126	128

The second set of analyses was conducted on AuC values for all outcomes, but excluding data from participants who displayed an AuC of 0.0 for any of the seven commodities. These analyses yielded the smallest sample because a substantial number of participants displayed an AuC value of 0.0 on the social issues of abortion, affirmative action, and legalization of gay marriage. However, these analyses did allow for some conclusions to be drawn about a broader range of issues for the individuals who discounted all seven commodities (indicating that all had some value).

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1 Technically, one could argue that participants who displayed an AuC value of either 0.0 or 1.0 did not display discounting. Only those with values of 0.0, however, were excluded from some analyses. The reason for their exclusion was that, for those participants, that particular commodity had no present value to them and, in all likelihood, never would. Participants who displayed values of 1.0, on the other hand, demonstrated that that particular commodity had a value, and one can reasonably assume that they would have displayed some discounting if even longer delays had been employed (e.g., 100 years).

The third set of analyses was conducted on the entire sample. Because these analyses included participants who displayed AuC values of 0.0, the results do not necessarily inform us as to the phenomenon of discounting. However, as noted above, an AuC value of 0.0 for a specific commodity is not devoid of information. Rather, it informs us that, for a particular individual, that particular commodity has no value. By conducting analyses with these data included, it was possible to assess how the entire sample valued the proffered outcomes.

Discounting of Outcomes That Were Valued by Most Participants

A one-way repeated measures ANOVA was conducted on the AuC values for all participants (194 out of the original 199) who had an AuC value above 0.0 for *each* of the outcomes concerning child care ($M = 0.721$, $SD = .173$), domestic-violence offenders ($M = 0.712$, $SD = .210$), sciences classes ($M = 0.736$, $SD = .185$), and winning \$100,000 ($M = 0.796$, $SD = .172$). Results indicated that a significant difference was observed across commodities, $F(3, 579) = 12.62$, $p < .001$, $\eta^2 = .061$. Post hoc Tukey HSD comparisons indicated that participants discounted money significantly less than each of the three social policy outcomes. However, no significant differences were observed between the outcomes concerning child care, domestic violence, and sciences classes.

The PCA indicated a one-factor solution. A similar outcome was observed for the PAF analysis, which accounted for 52.51% of the variance. The factor loadings for both analyses are presented in Table 2.

Table 2
Factor Loadings From the PCA and PAF Analysis Conducted on the Outcomes That Held Some Value (i.e., AuC > 0.0) for Nearly All of the Participants (n = 194)

Outcome	PCA	PAF
Child care	.616	.442
Domestic violence	.739	.597
Sciences classes	.836	.845
Won $100,000	.690	.542

Discounting of All Outcomes When All Outcomes Were Valued

The top graph in Figure 1 displays the mean AuC values based on data for the 111 participants who displayed a non-zero AuC value across all seven commodities tested. As was the case in the previous set of analyses, the largest AuC value (i.e., the least discounting) was observed for winning \$100,000. The second and third least discounted outcomes concerned affirmative action and legalizing gay marriage.

A one-way repeated measures ANOVA of these data showed a significant difference in discounting across outcomes, $F(6, 660) = 5.79$, $p < .001$, $\eta^2 = .211$. Post hoc Tukey HSD comparisons, using a $p < .01$ criterion, indicated that participants discounted winning \$100,000 significantly less than the social issues of prosecuting domestic-violence offenders and expanding access to abortion. The difference between the social issues of affirmative action and abortion was also significant. No other comparisons met the $p < .01$ threshold.
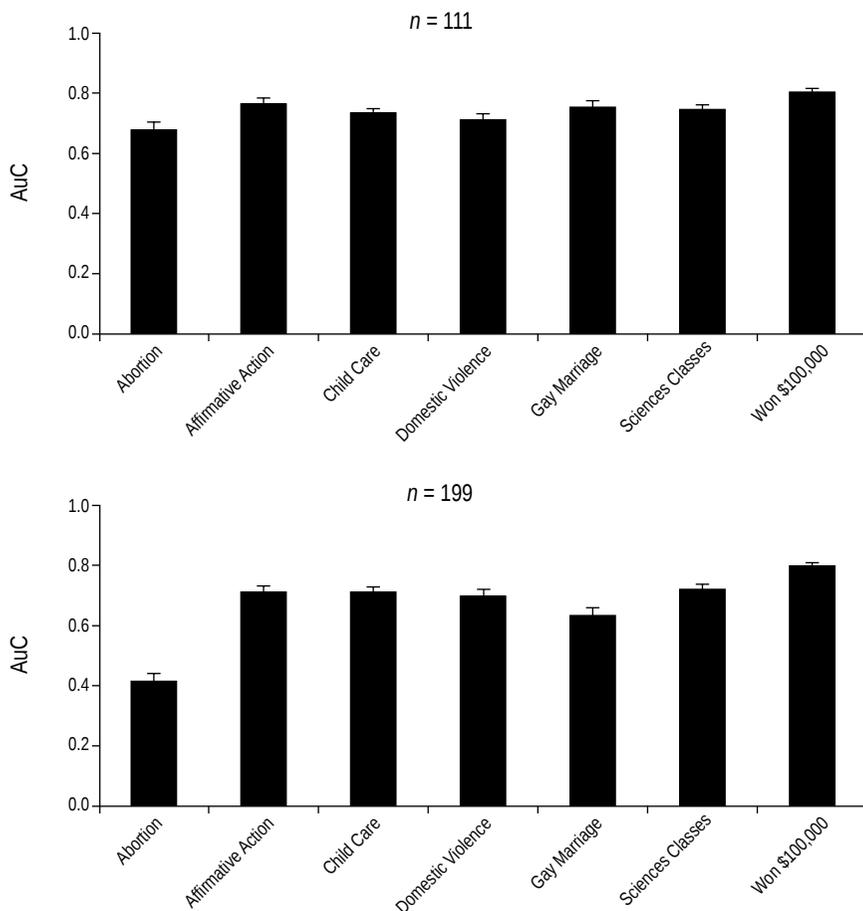
Figure 1. Mean AuC values for each outcome. The top graph presents data for all outcomes when those participants with an AuC of zero were excluded; the bottom graph presents data from all participants. The error bars represent one standard error of the mean.

The PCA again indicated a one-factor solution, and a similar outcome was observed for the PAF analysis, which accounted for 46.88% of the variance. The factor loadings for both analyses are presented in Table 3.

Table 3
Factor Loadings From the PCA and PAF Analysis Conducted on All Outcomes for the 111 Participants for Whom All Commodities Held Some Value (i.e., AuC > 0.0)

Commodity	PCA	PAF
Abortion	.534	.443
Affirmative action	.785	.747
Child care	.484	.398
Domestic violence	.734	.670
Gay marriage	.697	.623
Sciences classes	.810	.784
Won $100,000	.682	.603

AuC Values for All Outcomes for All Participants

The bottom graph in Figure 1 displays the mean AuC values for all seven commodities based on data for all 199 participants. Again, the largest mean AuC value was observed for winning $100,000 and the smallest was observed for abortion. The inclusion of data from participants who displayed AuC values of 0.0, however, altered the relative distribution of the AuC values across the other commodities compared to the top graph of Figure 1. Legalizing gay marriage, for instance, had the second smallest mean AuC value when all participants were included.

A one-way repeated measures ANOVA showed a significant difference in AuC values across outcomes, $F(6, 1188) = 53.94$, $p < .001$, $\eta^2 = .214$. Post hoc Tukey HSD comparisons, again using a $p < .01$ criterion, indicated that AuC values for abortion were significantly lower than for any other outcome. Legalizing gay marriage produced a mean AuC value that was significantly lower than those for affirmative action, child-care funding, increasing funding for teaching girls math and science, and winning $100,000. The mean AuC value for winning $100,000 was significantly larger than that for every social policy issue except increasing funding for teaching girls math and science. No other comparisons met the $p < .01$ threshold.

The PCA indicated a two-factor solution. The PAF analysis also identified a two-factor solution, with the two factors accounting for 55.21% of the variance. The factor loadings for both analyses are presented in Table 4. The majority of the commodities loaded onto the first factor. Abortion and gay marriage loaded onto the second factor, with affirmative action crossloading on both factors.

Table 4
*Factor Loadings From the PCA and PAF Analysis Conducted on the AuC of All Participants for All Outcomes (*n = 199)

	PCA		PAF	
Outcome	Factor 1	Factor 2	Factor 1	Factor 2
Abortion	−.005	**.822**	.101	**.395**
Affirmative action	**.656**	**.357**	**.578**	**.342**
Child care	**.663**	−.085	**.495**	.042
Domestic violence	**.729**	.061	**.565**	.185
Gay marriage	.229	**.739**	.170	**.722**
Sciences classes	**.799**	.187	**.798**	.190
Won $100,000	**.585**	.188	**.478**	.164

Note. Factor loadings > .3 are indicated by bold typeface.

Table 5 presents the bivariate correlations observed between two of the demographic variables (i.e., political party affiliation and church attendance) and the AuC values for the seven different outcomes. Consistent with the previous factor analyses, these two demographic variables tended to correlate with the outcomes that loaded onto Factor 2 (see Table 4), but not with the other outcomes.

Table 5
Intercorrelations Among the Demographic Variables of Political Party Affiliation and Regular Church Attendance and the AuC Values for the Seven Commodities (n = 199)

	PP affiliation	Church attendance	Abortion AuC	AA AuC	CC AuC	DV AuC	GM AuC	SC AuC	$$ AuC
Political party (PP) affiliation	.	.245**	-.319**	-.149*	.049	-.079	-.378**	-.072	.008
Church attendance	.	.	-.431**	-.113	.048	.024	-.326**	-.064	-.060
Abortion AuC	.	.	.	.192**	.106	.054	.309**	.164*	.162*
Affirmative action (AA) AuC	.	.	.	.	.274**	.377**	.348**	.547**	.355**
Child care (CC) AuC	.	.	.	.	.	-.353**	.102	.405**	.193**
Domestic violence (DV) AuC	.	.	.	.	.	.	.290**	.453**	.306**
Gay marriage (GM) AuC	.	.	.	.	.	.	.	.270**	.169*
Sciences classes (SC) AuC	.	.	.	.	.	.	.	.	.435**
$100,000 ($$) AuC	.	.	.	.	.	.	.	.	.

Note. Codings were as follows: political party affiliation (Democrat = 1, Independent/Don't know = 2, Republican = 3) and church attendance (Do not regularly attend = 1, Regularly attend = 2).
* $p < .05$. ** $p < .01$

Discounting Curves

Figure 2 presents the discounting curves that were observed for the different outcomes. Two different functions are presented for each outcome. The first is the median indifference point at each different delay for the sample of individuals who displayed AuC values greater than 0.0 for all seven outcomes ($n = 111$). The second is the median indifference point at each delay for the entire sample ($n = 199$). The regression line for each data set was fitted using a hyperbolic equation (Mazur, 1987).
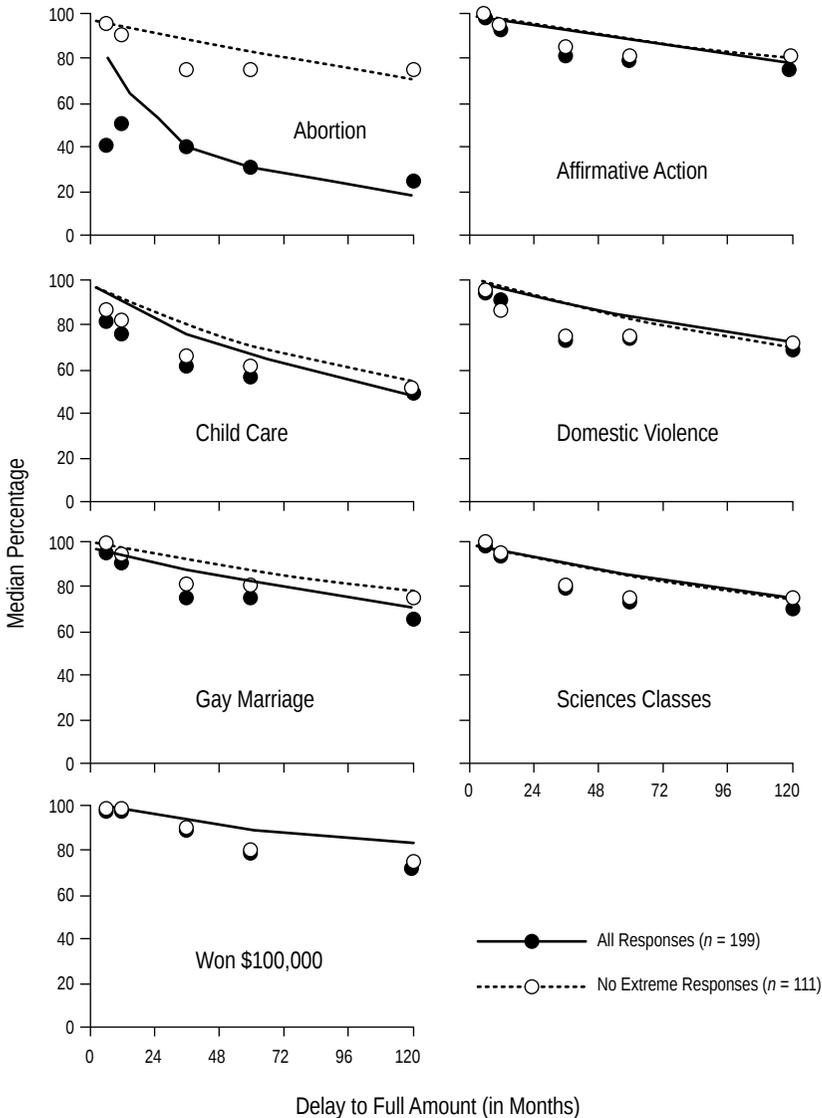
Figure 2. Median indifference points as a function of delay for each outcome. Open circles represent data for the sample of participants who displayed AuC values greater than 0.0 for every outcome ($n = 111$); closed circles represent data for the entire sample ($n = 199$). The functions represent the best fit lines using the hyperbolic equation V = A / (1 + kD).

Discussion

The purpose of the present investigation was to study how participants evaluated delayed hypothetical monetary and social policy outcomes. Three different approaches were used. The first was to compare discounting of social policy outcomes with discounting of money when nearly all participants displayed some level of discounting for those outcomes. The second was to compare discounting of a broader range of social policy outcomes with discounting of money, but to limit the comparison to a subsample of participants who displayed some level of discounting for all outcomes. The third approach was to compare discounting of all outcomes across all participants. Although this last approach could not inform us as to the process of discounting (because some participants did not value the outcomes and thus did not discount them), it did allow us to assess the value participants placed on the different outcomes that were tested.

Results from the first two approaches were similar. In both cases, participants displayed the least amount of discounting for the hypothetical monetary amount of $100,000. Discounting was significantly less for this outcome than for the three social policy issues that held some value (i.e., AuC > 0.0) for most participants (i.e., child care, increasing prosecution of domestic-violence offenders, and increasing funding for teaching girls math and science). Money was also discounted significantly less than expanding access to abortion for the participants who displayed non-zero AuC values for all of the proffered outcomes. These results are of interest because previous research (e.g., Hardisty & Weber, 2009) did not find differences in the discounting of money and environmental-policy outcomes. As noted previously, however, the future costs and likelihood of social policies continuing to be implemented may make them different from the commodity of money, causing social policies to be discounted more than monetary amounts. On their face, the present results would seem to support this latter conclusion.

Before accepting this conclusion, however, one must take into account that the present results were likely influenced by the monetary amount employed (i.e., $100,000). Research on delay discounting has repeatedly shown that rates of discounting vary inversely with the magnitude of the delayed consequence (e.g., Chapman, 1996; Thaler, 1981). Thus, one cannot say from the present results that money will always be discounted to a lesser degree than the present social policy issues. In fact, it is quite possible that, had we used a substantially lower monetary amount (e.g., $100), the results would have showed that participants discounted money to a greater degree than the present social policy issues. The fact that Hardisty and Weber (2009) employed smaller monetary amounts (e.g., $410) in their study would appear to support this possibility.

This possibility is also supported by the finding that, when analysis of the present data omitted AuC values of 0.0, the factor analyses indicated a one-factor solution. This outcome suggests that, although absolute differences in levels of discounting may have existed between or across commodities, discounting across them was not independent. At a theoretical level, these results support the conclusion that the process of discounting is occurring in a similar manner across the different social policy issues and the hypothetical monetary amount. As noted by Hardisty and Weber (2009) when referring to their results, this finding may be useful to policy makers because it suggests that, in at least some circumstances, policy makers can

utilize a single framework when looking at discounting of a variety of different issues. With that said, it may be unwise for policy makers to utilize only a single rate of discounting because discounting rates will differ as a function of magnitude.

These conclusions are based on individuals who indicated, through their responses, that the outcomes tested had value to them (i.e., their AuC values exceeded 0.0). The conclusions differ somewhat when data from individuals who indicated that they did not value some of the social policy outcomes were included in the analysis. If one views these data as informative as to the relative value of different outcomes, then the conclusion is that there are separate domains. One domain includes child care, prosecution of domestic-violence offenders, increasing funding for teaching girls math and science, and winning money, and possibly affirmative action as well. The other domain includes abortion, gay marriage, and possibly affirmative action. The former set of issues appears to be relatively independent of political perspective (as measured by party affiliation) or religiosity (as indicated by regular church attendance), whereas the latter seems to be mediated by those two factors.

The different results observed when participants with AuC values of 0.0 were either excluded or included in the analyses raise some interesting questions. Perhaps most importantly, how should such data be treated? That is, when dealing with the potential implications of instituting a less-than-complete policy now versus waiting to implement a more complete policy later, how does one factor in the opinion of the members of the population who do not want a policy implemented on that issue at any point in time? One solution may be to reverse the context of the question. With respect to abortion, for example, one might ask, what is the minimum percentage of instances you would be willing to make illegal to get the legislation passed immediately rather than waiting X time for abortion to be made completely illegal? However, because the social issue of abortion, and likely many other issues, may generate extreme positions regardless of how long policy implementation is delayed, a more complex solution may be required. With that said, a solution to this problem is necessary before measures of delay discounting will be maximally informative to policy makers.

Before drawing strong conclusions from the present study, it is also necessary to point out its limitations. One has to do with the framing of the questions. That is, had we used different wording, we might have observed different levels of discounting. One example is the question on affirmative action. We chose the present phrasing (i.e., affirmative action) because we anticipated that it would evoke a stronger reaction in some participants than would a potentially more neutral phrasing of the same issue (e.g., an "equal rights bill"). A similar argument could be made for "abortion" versus "pro-choice." The possibility that the context of the question may have influenced the results seems ripe for future research. That is, knowing if one would observe different rates of discounting depending on whether the issue is framed as affirmative action or equal rights would be useful information for those individuals advocating for this issue.

A related issue has to do with the potential partial acceptance of some of the social policy outcomes tested in the present study. For instance, although an individual may believe that abortion should be legal, the same individual may believe that it should only be legal in a small proportion of

instances (e.g., 10% of the time). This possibility makes this particular social policy outcome different from the others used in the present procedure and thus may account for why it was discounted significantly more than the other outcomes and garnered the lowest mean AuC values. It may be the case that such issues are discounted differently than those that involve increases in funding. However, future research will be required to address that possibility.

Other limitations may constrain the generality of the present findings. For one, the respondents in the present study were college students from a particular university, which could have influenced the results in several different ways. One factor is age, which varied little across the present sample. There is no guarantee that middle-age or elderly adults would hold the same opinions as our participants of the social policy issues examined in the present study. Another is how familiar the participants were with the social policy issues presented to them. One could argue that, because of their youthfulness, the participants might be somewhat less informed than older adults about these issues. The fact that two behavioral factors (i.e., political party affiliation and church attendance) were significantly correlated with the rates of discounting of several of the social policy outcomes, however, would suggest that participants were able to interpret the issues presented to them in the context of their own experience. Yet another factor is that the present sample was racially homogeneous (i.e., 94% Caucasian). Because there may be variations in how individuals of different races and/or cultural backgrounds value certain social policies, future research attempts would be well served by recruiting a more racially diverse sample of participants than that used in the present study.

It is also the case that the present study investigated only six social policy outcomes. Myriad other social issues could have been examined instead of, or in addition to, the ones we studied. Had we examined different or more social issues, it is quite possible that our factor analyses would have identified multiple-factor solutions. Thus, we cannot conclude that, when individuals discount social policies, they will always discount all of them in a similar way, although they may. It seems worthwhile to explore this matter further.

Yet another aspect of the procedure that may have influenced the results is our use of a multiple-choice format for collecting delay discounting data. Previous research has found that different methods of measuring delay discounting can result in different rates of discounting being observed (Smith & Hantula, 2008). Thus, if another method had been employed (e.g., the fill-in-the-blank method; Chapman, 1996), different findings and conclusions might have resulted. The data reflected in Figure 2 suggest that the present data resembled those typically reported. However, discounting for the monetary amount was not as steep as one might expect from the literature (e.g., Beck & Triplett, 2009; Smith & Hantula, 2008), especially given the delays used in the current study. This result may be related to the magnitude of our monetary amount (i.e., $100,000 vs. $10,000 in the Smith & Hantula, 2008, study). However, it could also be the outcome of the multiple-choice format. Regardless, the present procedure would seem to have some face validity. That is, when people are faced with a choice, they are often also presented with their possible choice options, and the present procedure mimicked such a situation. Future research will be needed to determine whether rates

of delay discounting of social policy outcomes vary as a function of the method of measuring discounting that is used.

The overarching goal of the present study was to demonstrate the translational value of research using a delay discounting framework. To this end, the present results demonstrate that such a technique can be extended to outcomes that have social relevance and that the data can potentially provide useful information has to how those outcomes are grouped and which demographic variables likely correlate with which social issues. Whether they realize it or not, people who are interested in promoting certain social issues are, in a sense, asking the citizenry to discount that particular issue to a lesser extent than other social issues. Thus, knowing how people discount certain social issues relative to others, what factors are associated with the rate of discounting of a particular issue, and how the framing of the issue may influence how it is discounted would seem to have practical value.

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Appendix

The Discounting Questions

Child Care[2]

The government is considering a nationalized child-care plan. It will take **X time**[3] to pass legislation that will increase what day care workers earn by 100%. It may be possible, however, to pass legislation immediately that will provide a lesser increase. What minimum percentage increase in day care workers' pay would you be willing to accept immediately rather than waiting **X time** for the 100% increase?

| 100% (willing to wait) | 95% | 90% | 85% | 80% | 75% | 70% |

| 65% | 60% | 55% | 50% | 45% | 40% | 35% | 30% | 25% |

20%   15%   10%   5%   0% (against any pay increase)

Domestic Violence

The Attorney General indicates that the office's goal is to increase the rate at which they prosecute perpetrators of domestic violence by 100%, but the program to do so will not start for **X time**. What is the minimum percentage increase in the rate at which domestic-violence perpetrators are prosecuted that you would accept to have the increase take effect immediately rather than waiting **X time**?

| 100% (willing to wait) | 95% | 90% | 85% | 80% | 75% | 70% |

| 65% | 60% | 55% | 50% | 45% | 40% | 35% | 30% | 25% |

20%   15%   10%   5%   0% (keep current rate)

Gay Marriage

Your state's governor says that s/he can guarantee passage of a comprehensive policy legalizing gay marriage in the state that includes 100% of the benefits (e.g., tax breaks, visitation rights, insurance coverage) enjoyed by married heterosexual couples. However, passage of that policy will take **X time**. What is the minimum percentage of the "complete" benefits package you would accept to have gay marriage legalized immediately rather than having to wait **X time**?

| 100% (willing to wait) | 95% | 90% | 85% | 80% | 75% | 70% |

| 65% | 60% | 55% | 50% | 45% | 40% | 35% | 30% | 25% |

20%   15%   10%   5%   0% (against gay marriage)

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2   Questions were not labeled for the participants.
3   **X time** = 6 months, 1 year, 3 years, 5 years, or 10 years.

Won $100,000

You have won $100,000 but you need to wait **X time** before you can collect the money. What is the minimum percentage of the $100,000 you would be willing to accept immediately rather than waiting **X time**?

100% (willing to wait)		95%	90%	85%	80%	75%	70%
65%	60%	55%	50%	45%	40%	35%	30%	25%
20%	15%	10%	5%	0% (I don't want the money)

Sciences Classes for Young Women

The local school board indicates that it will increase the amount of resources it devotes to girls learning math and science in grades 7–12 by 100%, but that they would not have the full amount of resources to do so for **X time**. They can, however, devote a lesser increase immediately. What minimum percentage increase in the amount of resources devoted to this issue would you be willing to accept immediately rather than waiting **X time**?

100% (willing to wait)		95%	90%	85%	80%	75%	70%
65%	60%	55%	50%	45%	40%	35%	30%	25%
20%	15%	10%	5%	0% (against more resources)

Affirmative Action

Your congressional representative says that Congress will be able to pass an affirmative action bill that will level the playing field, in terms of wages, for people of all races, religions, sexual orientation, and gender. However, it will take **X time** before that bill will be passed. Your representative indicates that a less-than-perfect affirmative action bill can be passed immediately. What minimum percentage of perfect would you be willing to accept to have the bill passed immediately rather than waiting **X time**?

100% (willing to wait)		95%	90%	85%	80%	75%	70%
65%	60%	55%	50%	45%	40%	35%	30%	25%
20%	15%	10%	5%	0% (keep current policy)

Abortion

Legislation that would make abortion legal in 100% of the potential instances is making its way through Congress. Experts, however, believe that it will be **X time** before the bill becomes law. What is the minimum percentage of instances you would be willing to make abortion legal to get the legislation passed immediately rather than waiting **X time**?

100% (willing to wait)		95%	90%	85%	80%	75%	70%
65%	60%	55%	50%	45%	40%	35%	30%	25%
20%	15%	10%	5%	0% (against abortion)

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