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RESEARCH

Religious Orientation, Personality, and Attitudes About Human Stem Cell Research

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Human stem cell research has revived long-standing debates regarding the sanctity and beginning of life. The current study addresses the issue by examining the ability of selected religiosity and personality variables to predict attitudes regarding stem cell research. Participants were given questionnaires measuring attitudes regarding stem cell research, along with the Need for Closure scale, the Internal Control Index, the Need for Uniqueness scale, religious orientation scales, and the Literal-Antiliteral-Mythological scale. Results indicate that those who hold more traditional religious beliefs are likely to oppose stem cell research for moral reasons, whereas those who have a more open-ended approach to religion are likely to be in favor of such research. Results also showed that personality variables were helpful in predicting people's confidence in institutions' ability to manage the ethical questions surrounding such research.

A human stem cell is a pluripotent cell, meaning that it can develop into most of the cells in the human body (Begley, 2001; Robinson, 2001). Found in human blastocysts less than 1 week old, stem cells are typically harvested from frozen embryos discarded following in-vitro fertilization treatments (University of Wisconsin–Madison, n.d.). Evidence suggests that these cells can be used to treat several types of diseases, such as diabetes mellitus, Parkinson's, and Alzheimer's disease (Stephens & Kelley, 2001; University of Wisconsin–Madison, n.d.) and may even allow physicians to replace any type of body tissue, such as damaged arteries and hearts (Begley, 2001; Stephens & Kelley, 2001).

Human stem cell research has revived long-standing debates regarding the sanctity and beginning of life (Sandel, 2004). Although these questions have been informed by religion

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(e.g., Copland, 2004; Decker, 2007; Tsai, 2005), it is certainly the case that religions have achieved no consensus on the issue. Evans (n.d.) noted that the Roman Catholic Church's official teachings hold that life begins at conception and that Evangelical Protestants tend to hold the same position. Such a stance implies opposition to stem cell research because God alone has the right to destroy human life (Green, 2001). For example, an Evangelical Christian organization, the Center for Bioethics and Human Dignity (2001), recently concluded that embryos are "the tiniest of human beings" and not "mere biological tissues or clusters of cells." In contrast, mainline Protestants generally hold that an embryo does not have the same status as a living person and may be used in some cases for medical purposes (Evans, n.d.). Judaism tends to agree with the mainline Protestants on this point.

Religious institutions may promote a specific view on issues, but individuals may deviate from that position, of course, making it essential that we investigate the question empirically. Unfortunately, data doing this are quite limited. In what appears to be the only study of its kind, Nisbet (2005) examined the question with a random sample of 2,122 U.S. adults, measuring their religious affiliation (Protestant vs. Catholic), religious belief (agreement with a conservative religious view), and frequency of church attendance. Although religious affiliation and other demographic variables predicted opinions regarding stem cell research, the effect was mediated by religious belief and attendance. Individuals who endorsed more conservative beliefs, and those who attended church more frequently, showed less support for stem cell research. These differences interacted with self-reports of awareness of stem cell research: Highly religious people opposed stem cell research regardless of how aware they were of such research, but moderately and nonreligious people increasingly favored stem cell research when they reported having greater awareness of such research.

Despite mixed denominational differences, general religious beliefs are among the most accurate predictors of moral attitudes (Scheepers & Van der Silk, 1998); therefore, measures of religious beliefs should be predictive of attitudes on stem cell research as well, as Nisbet (2005) demonstrated. To elaborate on Nisbet's findings regarding religion, our study includes a broader array of religion measures. We also explore the nature of stem cell attitudes themselves.

Perhaps the most commonly used measures of religiosity are based on Allport and Ross's (1967) intrinsic–extrinsic–religious orientation (Donahue & Nielsen, 2005). We expected that intrinsic religiosity would be associated with a more cautious perspective on stem cell research. On the other hand, we expected that the more utilitarian perspective toward religion suggested by the extrinsic orientation would not be particularly useful in predicting attitudes regarding stem cell research. Supplementing the intrinsic and extrinsic orientations is Batson's (see Batson, Schoenrade, & Ventis, 1993) Quest orientation, which describes a relatively open-ended engagement in matters of faith. Based on the finding that Quest scores are correlated with more complex moral reasoning (Sapp & Gladding, 1989), which may leave open the possibility that stem cell research would not be rejected out of hand, we explored the possibility that Quest scores would be associated with more favorable attitudes regarding stem cell research.

Another, less commonly used way of describing religious beliefs, is Hunt's (1972) Literal, Anti-literal, Mythological distinction. Expecting that greater literalism would be associated with opposition to stem cell research (Evans, 2002; Nisbet, 2005), this scale also was included in our study. The utility of Anti-literal and Mythological scale scores in predicting attitudes on stem cell attitudes was less certain.

In addition to the religion measures, several personality variables also were utilized in this study. First, need for cognitive closure—a desire to quickly find answers to one's questions rather than to deal with confusion and ambiguity (Webster & Kruglanski, 1994)—was expected to predict more desire to have a quick decision to the debate regarding governmental support of stem cell research. On the other hand, need for uniqueness—a desire to be different from other people (Snyder & Fromkin, 1977)—was expected to be associated with support for stem cell research because people high in this need should feel less constrained to adopt whatever restrictive position might be advocated by their religious groups.

Locus of control refers to the extent to which people see themselves as being in control of the events that happen to them (Berger, 1991). An external locus of control suggests that outside forces such as luck, fate, or chance are responsible for events, whereas an internal locus of control suggests that the individual is responsible for the events that occur (Berger, 1991). Duttweiler (1984) broke internal control into two dimensions, termed *approval seeking* and *leadership*. The association of these dimensions with attitudes on stem cell research was explored, but no specific hypotheses were offered.

We were interested in obtaining a more nuanced understanding of attitudes regarding stem cell research than merely the extent to which people support or oppose it in general. To explore these dimensions, we included 66 items based on statements gleaned from news reports of stem cell research. These were used to develop scales measuring separate facets of the stem cell debate, focusing particularly on moral objections, institutions' ability to address ethical issues, and funding of stem cell research.

Finally, in our study we developed two sets of scales, one that addressed "stem cell" research, and another that addressed "embryonic" research. These terms were selected because they seem to be used interchangeably in media accounts of stem cell research, and yet they may connote differences in human status. Therefore, we wished to explore the possibility that people might make fine distinctions on the issue of stem cell research.

To summarize, the primary purpose of this study was to determine some of the characteristics associated with opinions regarding stem cell research. We predicted that those in favor of stem cell research would be people who score high on need for uniqueness and those who favor a quest religious orientation. Opposition to stem cell research would be associated with high levels of intrinsic religious orientation, a more literal interpretation of religious texts, and a high need for closure.

METHOD

Participants

A total of 151 undergraduate students (123 females, 28 males) participated for extra credit in their general psychology courses at a large southeastern U.S. university.[1] As expected,

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[1]Participants' mean age was 20 years old (range = 18–39). They tended to self-identify as White (60%), with 35% identifying as an African American and the remaining 4% of the sample identifying as Hispanic, Asian, or other. Approximately one third of the participants reported being Southern Baptists (36%), whereas 16% marked "Other Christian," 16% described themselves as "Other Baptist," and 12% as United Methodist. No other denomination comprised more than 10% of the sample.

demographic variables were not meaningfully related to the stem cell or embryonic scales discussed next; therefore they were dropped from further analysis.[2]

Materials and Procedure

Materials consisted of a series of questionnaires that used a 1 (*disagree strongly*) to 5 (*agree strongly*) response format. The first questionnaire, developed by the authors, consisted of 66 items designed to measure various facets of stem cell research. Items for this questionnaire were based on statements or issues described in publications, stories, and op-ed pieces regarding stem cell research. Because the popular press often includes mention of research using both "stem cells" and "embryos," approximately half of the items addressed aspects of "stem cell research," whereas the other half addressed aspects of "embryo research." The second set of questionnaires measured dimensions of personality. It consisted of need for uniqueness (Snyder & Fromkin, 1977), need for cognitive closure (Kruglanski, Webster, & Klem, 1993), and the Internal Control Index (Duttweiler, 1984). The third set of questionnaires included Allport's Intrinsic and Extrinsic scale items as modified by Batson and colleagues (1993), along with Batson et al.'s Quest scale. Next was Hunt's (1972) Literal, Anti-literal, Mythological scale, modified so that individuals rated their agreement with each of the response alternatives using the same 1-to-5 scale that was employed for the previous questionnaire items. The questionnaire also included a section to record demographic information.

Participants first read and signed an informed consent statement, then completed the questionnaire items. Most participants completed the questionnaire in fewer than 50 min.

RESULTS

Scale Development

Analysis of stem cell items began by constructing scales that measured dimensions of attitudes regarding stem cell research. As mentioned earlier, there were two sets of parallel items that measured features of research using human stem cells or human embryos. Based on this fact, it was decided to use a more conceptually driven method for developing the scales rather than a purely empirical method. Items were grouped according to their relevance to three areas: the moral concerns regarding the research, institutions' ability to deal effectively with the ethical

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[2]Given the extreme skewness of the demographic variables in our study, no meaningful predictive analyses can be computed. Examining possible trends in the data through correlational analyses between the stem cell and embryonic scales with the demographic variables of gender, age, ethnicity, and denominational affiliation offers little to no evidence of these variables being meaningfully related, $r_{pb}(124) < 0.22$. The forgoing conclusion is further supported when examining cell means, all Fs < 1. Therefore, the results of the study are more indicative of a younger White female Baptist sample. However, such a sample was expected and its relative homogeneity is well-suited for theoretical testing (Mook, 1983). If the purpose of our study was to test for denominational or geographic differences in people's attitudes about human stem cell research, our sample would be inadequate. Instead, the research represents an initial investigation into the theoretical relationships between the chosen religious and personality variables and attitudes regarding stem cell research.

issues, and institutional funding of this research. Then, for each of these three conceptual areas, items were divided into those that addressed stem cell research and those that focused on embryonic research. Coefficient alpha was calculated separately for the stem cell and embryonic research items, respectively; items that did not contribute to internal consistency were dropped from the analysis, and the analysis was repeated. Scale scores were computed by averaging the relevant items forming the scale. Items comprising the respective scales are shown in the appendix.[3]

The first class of items addressed people's moral objections regarding this type of research. The Moral Objections–S (stem cell) scale (coefficient $\alpha = .87$) included 9 items such as "Stem cell research is immoral" and "Stem cells have souls." The Moral Objections–E (embryonic) scale (coefficient $\alpha = .89$) consisted of 11 items roughly parallel to those of its stem cell counterpart.

The ability of institutions to deal with the ethical issues involved in stem cell/embryonic research was addressed next. For both stem cell and embryonic research, three separate items addressed the ability of government agencies, corporations, and universities to address ethical issues involved in such research. Coefficient alphas for both the Institutional Ethics–S and Institutional Ethics–E scales were .85.

The question of funding such research was addressed next. For both stem cell research and embryonic research, items regarding the desirability of government and universities to provide funding were asked in three separate items. Coefficient alphas for the Funding–S and Funding–E scales were .76 and .80, respectively.

Analysis

Significant correlations among the stem cell and embryonic scales, personality and religious scales, and the combination between them are found in Table 1. The correlations show that similar relationships do exist between stem cell and embryonic scales, but this initial analysis does not indicate which variables are better at predicting participants' attitudes either within or between the religious and personality domains. A series of simultaneous regression analyses were conducted to examine the relationship between the religion and personality measures and each of the six scales concerning stem cell and embryonic research. The relationship among these variables was tested with each of the six scales being used as separate dependent variables. As Table 2 shows, only three models accounted for a significant amount of variance in stem cell and embryonic research attitudes: Moral Objections–S, Moral Objections–E, and Institutional Ethics–E. Specifically, 25% of the variance in Moral Objections–S scores was accounted for by the optimal linear combination of the religious and personality measures, $F(11, 112) = 3.39$, $p < .001$, whereas 27% of the variance in Moral Objections–E scores was accounted for by the same combination, $F(11, 112) = 3.75$, $p < .001$. Also mirrored in the aforementioned finding were the significant measures within each of the significant models. For both Moral Objections–S and Moral Objections–E the Intrinsic Religious Orientation ($B = .25$, $p = .03$ and $B = .29$, $p = .02$, respectively) and Religious Literalism scales ($B = .33$, $p = .006$ and $B = .33$, $p = .01$, respectively) were positively associated. That is, for every 1-point increase

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[3]The entire item list is omitted for sake of space but may be obtained from the first author.

TABLE 1
Significant Correlations Between Measures

Correlation Group	Measures	r
Embryonic and stem cell	Moral Objections–S/Moral Objections–E	.84
	Moral Objections–S/Funding–S	−.44
	Moral Objections–S/Funding–E	−.40
	Moral Objections–E/Funding–S	−.28
	Moral Objections–S/Funding–E	−.27
	Institutional Ethics–S/Institutional Ethics–E	.91
	Institutional Ethics–S/Funding–S	.17
	Institutional Ethics–S/Funding–E	.21
	Institutional Ethics–E/Funding–E	.21
	Funding–S/Funding–E	.88
Personality and embryonic/stem cell	Uniqueness/Institutional Ethics–S	−.22
	Uniqueness/Institutional Ethics–E	−.23
	Closure/Institutional Ethics–S	.17
	Closure/Institutional Ethics–E	.18
	Approval/Institutional Ethics–S	.17
	Approval/Institutional Ethics–E	.21
	Approval/Funding–S	.24
	Approval/Funding–E	.20
Religiosity and embryonic/stem cell	Intrinsic/Moral Objections–S	.35
	Intrinsic/Moral Objections–E	.40
	Quest/Moral Objections–S	−.27
	Quest/Moral Objections–E	−.27
	Quest/Funding–S	.25
	Literalism/Moral Objections–S	.41
	Literalism/Moral Objections–E	.41
	Anti-Literalism/Moral Objections–E	−.20
	Mythological/Moral Objections–E	−.22
Personality and religiosity	Approval/Extrinsic–Social	.24
	Approval/Quest	.22
	Leadership/Extrinsic–Social	−.21

Note. Only correlations significant at the $p < .05$ (two-tailed) level are reported. S = stem cell; E = embryonic.

in moral objections scores, intrinsic religiosity and literalism also individually increase, when holding the other religion and personality scores constant. Approval seeking showed similar mirror effects in the pairs of institutional ethics and funding models, with the Institutional Ethics–E model reaching statistical significance.

Given the significant models, it is important to separate the religion and personality measures into sets to determine the proportion of variance accounted for by each. Because religiosity measures (i.e., intrinsic and literalism) individually accounted for the most variance in the two moral objections models, two separate hierarchical regressions were conducted to see if the religion measures would predict moral scores even after controlling for the personality measures. For the Moral Objections–S model, after accounting for the variance because of the personality measure set (1.5%), the religious measure set accounts for an additional 23.4% of the variance in Moral Objections–S scores, $F(7, 112) = 5.00$, $p < .001$. For the Moral

TABLE 2
Religiosity and Personality Variables Regressed on
Attitudes Regarding Stem Cell and Embryonic Research

Model and Measure	Statistics		
	R^2	F (df)	B
Moral Objections–S	0.25	3.39 (11, 112)*	
Intrinsic			0.25*
Literalism			0.33*
Moral Objections–E	0.27	3.75 (11, 112)*	
Intrinsic			0.29*
Literalism			0.33*
Institutional Ethics–S	0.13	1.42 (11, 110)	
Approval seeking			0.19*
Institutional Ethics–E	0.17	2.08 (11, 110)*	
Approval seeking			0.20*
Quest			−0.37*
Funding–S	0.13	1.57 (11, 111)	
Approval seeking			0.25*
Funding–E	0.08	0.91 (11, 111)	
Approval seeking			0.24*

Note. Only the significant betas are reported under each model.
S = stem cell; E = embryonic.
*$p < .05$.

Objections–E model, after accounting for the variance because of the personality measure set (2.3%), the religious measure set accounts for an additional 24.7% of the variance due to E–Moral scores, $F(7, 112) = 5.40$, $p < .001$. Given the significant amount of variance accounted for by the religion set, squared partial correlational coefficients were examined to determine the contribution of each significant religious predictor. For the Moral Objections–S model after completely removing the variance because of the other religion measures, 20.2% of the remaining variance in Moral Objections–S scores is accounted for by intrinsic religious orientation, whereas 25.8% is accounted for by religious literalism. For the Moral Objections–E model after completely removing the variance because of the other religion measures, 21.8% of the remaining variance in Moral Objections–E scores is accounted for by intrinsic religious orientation, whereas 24% is accounted for by religious literalism.

For the Institutional Ethics–E model, the religiosity variables were used as controls given the larger amount of variance accounted for by the approval-seeking measure. After accounting for the variance because of the religion measure set (9.9%), the personality measure set accounts for an additional 7.4% of the variance in Institutional Ethics–E scores, $F(4, 110) = 2.45$, $p = .05$. Squared partial correlational coefficients found that after completely removing the variance because of the other religion measures, 19% of the remaining variance in the first Institutional Ethics–E model is accounted for by Quest religious orientation. Similarly, 21% of variance in the second model is accounted for by approval seeking after completely removing the variance because of the other personality measures.

Comparisons of Stem Cell and Embryonic Research

The previous analyses indicate that the same pattern of results is at work when considering how attitudes toward stem cell—or embryonic—research are associated with the religious and personality variables. The next step of data analysis involved comparing the average level of agreement that participants had with stem cell and embryonic research items. Results of these comparisons showed that people had stronger objections on moral grounds regarding stem cell research ($M = 2.90$, $SD = 0.69$) than they did with embryonic research ($M = 3.19$, $SD = 0.76$), $t(150) = -8.72$, $p < .001$. Respondents did not distinguish between the other dimensions of stem cell and embryonic research.

DISCUSSION

This study suggests several useful things regarding human stem cell research. Attitudes regarding human stem cell research can be predicted using religion and personality traits. Perhaps most interesting is the finding that when one examines different facets of the stem cell debate, attitudes on the issues are predicted better in some cases by religion and in other cases by personality. In particular, people with an intrinsically motivated, literalistic approach toward religion are more likely to have moral objections to this research than are those with a more open, questing orientation to religion. This is consistent with the results of nationally representative data on religion and attitudes toward human cloning (Evans, 2002). On the other hand, confidence in government or other institutions' ability to address the ethical questions is predicted more effectively by personality characteristics: low need for uniqueness, high need for closure, and high approval seeking.

Also of interest is the finding that people had stronger moral objections when the research referred to stem cells than when it referred to embryos. This may indicate that "embryo" suggests an organism that is not fully human and, therefore, that such research is morally acceptable. Alternatively, this finding may simply reflect participants' familiarity with the terms through news reports of the issue or other sources. Further study is needed to address the way that these terms are understood and their potential to affect people's attitudes toward the moral or other aspects of this type of research.

Our data represent an initial step in understanding the psychological factors that are associated with stem cell research; as such, there are certain caveats that must be addressed. Perhaps most important, the generalizability of these data to different age, ethnic, or other groups may be limited. Our intent here, however, is to investigate the correlates of attitudes and not group differences. As has been pointed out elsewhere (Laythe, Finkel, Bringle, & Kirkpatrick, 2002), there are several important benefits of attitudinal research that uses a relatively homogeneous sample. Although the mean score on an attitude measure may differ between groups, it does not follow that one would expect differences in the covariation among attitudes between different groups. Likewise, to the extent that attitudes vary among groups, relatively homogeneous samples such as ours are likely to underestimate correlations among variables. In a related vein, one benefit of using a homogeneous sample is that one controls for age and other variables that may be expected to correlate with the criterion. In many regards, these reflect the inevitable trade-offs between internal and external validity and are not strictly liabilities or limitations to a study.

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In the future, researchers might profitably investigate the influence of two other classes of variables on people's attitudes toward stem cell research. One set of variables concerns people's attitudes regarding abortion, euthanasia, and other social and life issues. For example, do the same factors that affect attitudes toward stem cell research also affect attitudes toward euthanasia? A second set of variables would examine other measures of personality, such as broader conceptualizations of traits (e.g., Goldberg, 1990), as well as personality operationalized as cognition and motivation (e.g., Pervin, 2002). Significant advances in understanding the role of personality traits (Piedmont, 2005), and the role of motivation on religious life (Pargament, 1997) suggest that future research on stem cell attitudes may benefit from investigation using constructs and techniques drawn from these areas.

Finally, although these data offer insight into the judgments that people make regarding the dilemmas surrounding stem cell research, one important question needs further attention: What about the possible medical benefits of stem cells? The therapeutic potential of stem cells may be particularly important to theologically liberal individuals (Evans, 2002). What happens to people's attitudes, and how do they correlate with religion and other variables, when one considers the possible benefits of stem cell research? Further research should be conducted that addresses this factor to determine more fully the conditions under which people consider the benefits to outweigh the risks. In the context of technological advances and rapidly increasing public interest in biotechnology (Bauer, 2005), questions such as these merit researchers' attention.

ACKNOWLEDGMENTS

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APPENDIX

Stem Cell Research Scales

Stem Cell Moral Objections (coefficient $\alpha = .85$)

1. Human life begins at conception.
2. Stem cells have souls.
3. Stem cell research is unethical.
4. Embryonic stem cell research is immoral.
5. Funding stem cell research would indirectly fund abortion.

6. By allowing funding for stem cell research we would be allowing human beings to be treated as objects.
7. The possible benefits of stem cell research outweigh the negative consequences of destroying embryos. (reverse coded)
8. Stem cell research should be continued. (reverse coded)
9. Stem cell research should not be banned. (reverse coded)

Stem Cell Ethics (coefficient α = .89)

1. Government agencies are able to address the ethical issues involved in stem cell research.
2. Corporations are able to address the ethical issues involved in stem cell research.
3. Universities are able to address the ethical issues involved in stem cell research.

Stem Cell Funding (coefficient α = .76)

1. The government should fund stem cell research.
2. Corporations should fund stem cell research.
3. Universities should fund stem cell research.

Embryonic Research Scales

Embryonic Moral Objections (coefficient α = .89)

1. Embryos have souls.
2. Human embryos obtained in vitro have rights.
3. The human embryo should not be destroyed even if the motivation is to help others.
4. The destruction of embryos for the good of other humans is wrong.
5. We have a moral responsibility not to deliberately harm embryos.
6. The fact that some embryos would be destroyed in the name of science is a threat to us all.
7. Destruction of embryonic life is unnecessary for medical progress.
8. Human embryos should not be used as a means of obtaining knowledge to benefit others.
9. Human embryos are tiny human beings.
10. Destroying embryos for research is murder.
11. Embryonic research should not be banned. (reverse coded)

Note. Items for the remaining two embryonic research scale items (ethics and funding) mirror those for the respective stem cell scales, substituting "embryo" or "embryonic" for "stem cell" as needed.