Predictors of Moral Reasoning: Components of Executive Functioning and Aspects of Religiosity

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The aim of the current study was to determine whether components of executive functioning and two diverging aspects of religiosity (scriptural literalism and quest) are significant predictors of postconventional moral reasoning. An additional goal of the study was to determine whether components of executive functioning moderate the relationship between religiosity and postconventional moral reasoning. Postconventional moral reasoning was assessed using the Defining Issues Test, Version 2 (DIT2), which is primarily based on Lawrence Kohlberg's model. Results indicated that components of executive functioning, along with quest, were significant predictors of postconventional moral reasoning and were significantly correlated with each other. In addition, analyses demonstrated that the relationship between quest and postconventional moral reasoning was moderated by performance on the Comprehension subtest of the Wechsler Adult Intelligence Scale, 3rd ed. (WAIS-III), a measure assessing social awareness and general reasoning.

Among modern theorists, Lawrence Kohlberg's model of moral reasoning and development is perhaps the most widely known and researched. According to Kohlberg's (1981) model, moral development is hierarchical and proceeds through three levels, comprised of six stages. At the lowest or preconventional level, he suggested that moral decisions are based on the physical consequences of action (i.e., the Punishment and Obedience Orientation stage) and/or the ethics of quid pro quo (i.e., the Instrumental Relativist Orientation stage). Elements of reciprocity and fairness exist, but are interpreted through the lens of one's own needs in a concretely pragmatic way.

At the intermediate or conventional level, the emphasis in decision making is on maintaining the existing social system. Kohlberg (1981) suggested that conventional moral reasoning is guided by stereotyped notions of "natural" or "good" behavior (i.e., the Interpersonal Concordance stage), and/or the drive to uphold society's laws, norms, and conventions, regardless of their perceived fairness (i.e., the Society Maintaining Orientation stage). The rules governing behavior at this level are concrete, like the Ten Commandments, leaving little room for ambiguity or relativism.

At the highest or postconventional level (a.k.a., the principled level), Kohlberg suggested that moral judgments are made in light of the *principles* that form the basis of society's norms and laws, as well as advancing the rights of every human being, even if doing so conflicts with existing laws or social norms (Kohlberg 1981). Here, the emphasis is on recognizing that laws and conventions, though necessary, need to be flexible in order to account for temporal and personal relativism, as well as standards that have been critically examined and agreed upon by the whole

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of society (i.e., the Social Contract Orientation stage). In addition, moral decisions at this level are guided by abstract universal principles, like the Golden Rule, that are consistent with the universal principles of justice, reciprocity, equality of human rights, and respect for the values and dignity of all human beings (i.e., the Universal Ethical Principle Orientation stage).

Kohlberg (1981: 26) believed that the capacity for "cognitive organization" is what likely determines which moral reasoning schema an individual predominantly uses. According to Kohlberg, cognitive organization reflects the ability to incorporate new information into an existing structure, making the structure more "comprehensive and equilibrated." He felt that the development of this ability proceeds in tandem with the development and maturation of the brain, and may be dependent on the same underlying resources as other forms of cognition. Though Kohlberg did not specifically name these *underlying resources*, developments in neuroscience over the past quarter-century give reason to believe that they may be tantamount to what is now referred to as executive functioning.

Kohlberg's model of moral reasoning, as well as the Defining Issue Test (DIT) (Rest 1979), which is the most widely used measure of Kohlbergian moral reasoning, have been criticized at times for not adequately accounting for situational concomitants (e.g., religious group loyalties) that may motivate individuals to prefer stages of moral reasoning below those at which they are cognitively capable (Ernsberger and Manaster 1981). To the best of our knowledge, this critique has not been adequately addressed in the literature.

Another frequent critique of Kohlberg's model is that the construct of postconventional moral reasoning (and the measures used to asses it) may reflect liberal-conservative political ideology (Emler, Resnick, and Malone 1983; Shweder 1982), rather than moral reasoning. In response to this claim, Narvaez et al. (1999) investigated religious and secular samples to determine if postconventional moral reasoning was empirically indistinguishable from liberal-conservative attitudes on public policy issues. Narvaez and colleagues found that while measures of religious fundamentalism, political ideology, and postconventional moral reasoning were significantly correlated with each other and with public policy attitudes, partial regression coefficients revealed that each of these factors maintained a significant relationship with public policy attitudes after controlling for the other two. Hence, Narvaez and colleagues concluded that religious fundamentalism, political attitudes, and postconventional moral reasoning, though correlated, cannot be reduced to each other, nor to a common factor of liberalism-conservatism. In addition, Narvaez and colleagues noted that while DIT P scores (i.e., postconventional moral reasoning scores) are sensitive to attitudes toward authority that often correspond to liberal and conservative political attitudes, DIT P scores were designed to encompass both liberal (e.g., Rawls 1993) *and* conservative communitarian (e.g., Sandel 1982; Walzer 1983) moral philosophies.

Executive Functioning

Executive functioning is a term generally used to describe a loose system of cognitive abilities that enables individuals to organize, evaluate, and modify their behavior, with the goal of optimizing outcomes in some future context. Unfortunately, there is little consensus about which cognitive abilities should be included in models of executive functioning, and this quandary represents a general limitation of research endeavors investigating the relationships between executive functioning and other factors (Salthouse 2005). Nevertheless, some cognitive abilities are more frequently included in models of executive functioning, such as *planning* (Stuss and Alexander 2000; Tranel, Anderson, and Benton 1994), *decision making* (Tranel et al. 1994; Troyer, Graves, and Cullum 1994), *problem solving* (Elliot 2003; Goldstein and Green 1995; Pennington 1997), *cognitive flexibility* (Eslinger 1996; Pennington 1997), *reasoning* (Goldstein and Green 1995; G. McCloskey, personal communication, December 10, 2002), *social awareness* (Groth-Marnat 1999; Lezak 1995), *strategic thinking*, *self-monitoring*, and *abstraction* (Troyer et al. 1994). Several of these cognitive abilities (e.g., decision making, problem solving, social awareness,

and reasoning) overlap with moral reasoning, while others (e.g., cognitive flexibility, abstraction, and self-monitoring) may be akin to the "cognitive organization" skills that Kohlberg (1981:26) believed pushes moral development.

Unfortunately, research investigations exploring the relationship between executive functioning and moral reasoning have mostly come in the form of case studies, assessing the influence of executive deficits resulting from traumatic brain injury (TBI) or pathologies of the prefrontal cortex. In one such report, Eslinger et al. (1992) detailed the skills and deficits of patient DT, a woman who suffered a localized injury to the left prefrontal lobe at age seven, 26 years before their evaluation of her. Eslinger and colleagues found that while DT's performance on measures of general intelligence (IQ), memory, language, and visual perception suggested limited impairment (i.e., her scores were in the low-normal range), her performance on various measures of executive functioning revealed marked impairment.

As an adult, DT became increasingly promiscuous, impulsive, and delinquent in the care of her daughter. In addition, she showed a limited capacity for empathic understanding, reciprocity, and abstract reasoning. Interestingly, DT's capacity for religious and moral understanding was relatively intact, but only as it pertained to concrete interpretations of biblical scriptures. Based on this case, Eslinger (1996) has since concluded that executive functioning underlies the psychosocial skills necessary for empathic understanding and moral maturity, including symbolic thinking, perspective taking, consideration of numerous alternatives, and consequential thinking.

Religiosity and Moral Reasoning

Researchers over the last few decades have been unable to identify a clear and consistent relationship between religiosity (i.e., the degree to which an individual participates in an institutionalized system, grounded in belief and worship of a God and/or spiritual leader) and moral reasoning. One reason for the observed inconsistencies is that there is tremendous variation between studies regarding sample characteristics and the specific aspects of religiosity and moral reasoning being assessed. In addition, almost all investigations examining the relationship between religiosity and moral reasoning assumed that this relationship was both linear and direct, when in fact it may be nonlinear and/or moderated by other constructs that have yet to be explored (Clouse 1985).

Regarding the investigations reviewed for the current study, a considerable proportion reported an inverse relationship between conservative/orthodox religiosity and a measure of moral reasoning (see review by Getz 1984 for a comprehensive review of earlier studies). Among these reports, postconventional moral reasoning was found to be inversely related to *scriptural literalism* (Brown and Annis 1978; Narvaez et al. 1999), *religious dogmatism* (Wahrman 1981), *conservative religious ideology* (Clouse 1979, 1985; Glover 1997; Lawrence 1979; Sanderson 1974), and *denominational orthodoxy* (Cady 1982; Ernsberger 1977; Ernsberger and Manaster 1981).

In contrast to these studies, several others revealed a *positive* relationship between a measure of moral reasoning and conservative religious ideology or religious observance. Among these investigations, moral reasoning was reported to have a direct relationship with both *religious school attendance* (Guttmann 1984; Hilfer 1980; Killeen 1978; Moran and Jennings 1983; Sharfman 1974) and *religious knowledge* (Harris 1981; O'Gorman 1979). Unfortunately, however, many of these studies involved younger subjects that may have reached a developmental ceiling at Kohlberg's conventional level. Hence, these investigations may have been limited by a range restriction, preventing an assessment of the entire continuum of moral reasoning schemas.

In addition to identifying a positive relationship between moral reasoning and an aspect of religiosity, it is interesting that several of the investigations noted above (Harris 1981; Hilfer 1980; Killeen 1978) also found a positive relationship between a component of cognitive functioning and postconventional moral reasoning. Hilfer reported a significant correlation between abstract reasoning and P scores on the DIT; Killeen reported that Catholic high school students who had higher P scores than their secular counterparts also scored higher on a measure of abstractness

in religious thinking; and Harris reported a significant correlation between grade point averages and P scores. These findings lend support to the proposed relationship between cognitive (i.e., executive) functioning and moral reasoning, and underscore the raison d'être of the current study.

Quest

According to Batson, Schoerade, and Ventis (1993:169), quest denotes "the degree to which an individual's religion involves an open-ended, responsive dialogue with existential questions raised by the contradictions and tragedies of life." The original Quest (Interactional) Scale was introduced by Batson (1976) in an attempt to identify and measure a third dimension of religiosity, not accounted for by the Extrinsic and Intrinsic subscales of Allport and Ross's (1967) Religious Orientation Scale. The Quest Scale was later modified and shortened to six items by Batson and Ventis (1982), and since then, Batson and Schoenrade (1991a, 1991b) have released a new 12-item version of the scale.

Batson and Schoenrade (1991a, 1991b) reported that correlations among the three versions of the scale are quite high (ranging from 0.85 to 0.95), and data from the three versions indicate that quest is statistically independent from the other two dimensions (intrinsic and extrinsic religiosity) of Allport's (1966) original schema. In validating the 1982 version of the Quest Scale, Batson and Ventis (1982) found Princeton Theological Seminary students to score significantly higher than moderately religious undergraduates on both the Quest Scale and Allport and Ross's (1967) Intrinsic Scale, and significantly lower on Allport and Ross's (1967) Extrinsic Scale.

Some critics of the Quest Scale suggest that the construct assessed by this measure is not a genuine aspect of religiosity and can be easily reduced to agnosticism (Donohue 1985), anti-orthodox sentiment (Watson, Morris, and Hood 1989), and/or liberalism (Paloutzian 1983; Wulf 1997). In response to critics equating quest with agnosticism, Batson and Schoenrade (1991a) have since argued that while quest is sometimes found to be inversely correlated with measures of religious orthodoxy (Batson and Ventis 1982), these correlations are weak, and "much room is left for high scorers on Quest Scale to have strong beliefs and low scorers to have weak beliefs" (1982: 422). Moreover, the finding that Princeton seminarians, a group "reasonably identifiable as religious," scored significantly higher than moderately religious undergraduates on the Quest Scale in a previous study (Batson and Ventis 1982:420) should at least partially inoculate the Quest Scale from the critique that it is simply a measure of agnosticism. In further support of Batson and Schoenrade's defense, Cottone (2005) found members of an undergraduate Catholic leadership program to score significantly higher on the Quest Scale than nonaffiliated Catholic undergraduates at an East Coast Catholic university.

Addressing other critiques of the Quest Scale, Burris et al. (1996) found that individuals who identified themselves as personally religious scored significantly higher on the Quest Scale than atheists, as well as members of conservative and liberal religious groups. Citing this study in a subsequent review of the Quest Scale, Burris (1999) concluded that quest represents a construct that is not simply reducible to agnosticism, anti-orthodox (religious) sentiment, or religious liberalism, but rather a *general* devaluation of social identifications, criticism of the status quo, motivation for personal freedom, and inclination toward effortful thought. Perhaps most germane to the current study, the Quest Scale has been shown to correlate positively with postconventional moral reasoning (Glover 1997; Sapp and Jones 1986), as well as cognitive complexity in dealing with religious questions (Batson and Raynor-Prince 1983).

Aim of the Current Study

The aim of the current study was to examine the relationships between postconventional moral reasoning (assessed by the Defining Issues Test, 2nd ed.; DIT2; Rest and Narvaez 1998),

executive functioning, and aspects of religiosity. Based on the findings of previous studies, the aspects of religiosity that seemed most appropriate to examine were scriptural literalism (an aspect of conservative/orthodox religiosity) and quest. The decision to use these measures was twofold. First, these measures assess diverging approaches to the observance of religious scriptures, similar to the way that observance to civil laws and conventions may differ between individuals who reason at the conventional and postconventional levels of moral reasoning. The Quest Scale is particularly appealing since it has been shown to measure a construct that is in *some* respects the antithesis of scriptural literalism, but not simply reducible to agnosticism or atheism (Batson and Schoenrade 1991a; Burris 1999; Burris et al. 1996). Second, both scriptural literalism (Getz 1984) and quest (Glover 1997; Sapp and Jones 1986) have been shown to correlate significantly with postconventional moral reasoning, though in different directions.

For theoretical reasons, the components of executive functioning that were selected for examination included cognitive flexibility, inhibition, abstract reasoning, and social awareness, as these functions may be tantamount to the "cognitive organization" skills that Kohlberg (1981) believed pushes moral development. Based on a review of the literature, the Stroop Color and Word Test (Golden 1978) was identified as a competent measure of both cognitive flexibility and inhibition, and was included in the current study. Regarding other measures, the Similarities subtest of the Wechsler Adult Intelligence Survey, 3rd ed. (WAIS-III; Wechsler 1997a, 1997b) was used as a gauge of abstract reasoning (Goldstein and Green 1995), while WAIS-III Comprehension was used to assess social awareness and general reasoning (Lezak 1995).

Hypotheses

Based on the reviewed literature, the following univariate hypotheses were made. Quest and components of executive functioning would correlate positively with postconventional moral reasoning, and positively with each other. Scriptural literalism, however, would correlate negatively with postconventional moral reasoning, as well as with quest and components of executive functioning. Regarding interaction effects, it was hypothesized that components of executive functioning would moderate the relationship between scriptural literalism and postconventional moral reasoning. More specifically, a negative relationship was predicted for individuals scoring high on measures of executive functioning, whereas a nonsignificant relationship between scriptural literalism and postconventional moral reasoning was predicted for individuals scoring low on measures of executive functioning. Finally, it was hypothesized that components of executive functioning would also moderate the relationship between quest and postconventional moral reasoning. Specifically, a positive relationship was predicted for individuals scoring high on measures of executive functioning, whereas a nonsignificant relationship was predicted between moral reasoning and quest for individuals scoring low on measures of executive functioning.

Method

Participants

Participants were recruited from St John's University's undergraduate and graduate student body and campus community. St John's University is a Catholic university located in Queens, New York with a student body that is diverse in age, race, ethnicity, and religious orientation. Recruitment was not limited by age, gender, race, or ethnicity; however, in order to control for variations due to general religious affiliation, only Christian participants were included in the current study. The denominational distribution of the sample was 76 percent Catholic and 24 percent Protestant. Among Protestants, 13 distinct denominations were represented, with Baptists (6 percent) and Lutherans (3 percent) being the most prevalent.

The total number of participants was determined based on a subjects-to-effects ratio of 10:1. Since there were five direct effects to be tested and six interaction effects, a minimum of 110 subjects was required. To account for the potential of missing data and/or elimination of outliers, 126 participants (age range = 18–73) were evaluated, with complete data collected on 119 participants. The gender distribution of participants was roughly 2:1 in favor of females (82 females, 44 males).

Measures

Background Questionnaire

This questionnaire was used to record demographic information including age, gender, race, ethnicity, college semesters attended (not including the current semester), cumulative grade point average (GPA), high school type (secular vs. religious), specific religious denomination, years practicing present denomination, parents' religious denomination, and participation in extracurricular religious or secular activities.

Stroop Color and Word Test (Stroop)

The Stroop (Golden 1978) is a traditional measure of executive functioning, assessing such components as inhibition, set shifting/cognitive flexibility, and attention (Golden 1978; MacLeod 1991; Pennington 1997; Pennington and Ozonoff 1996). The protocol involves three tasks: reading a series of randomly alternating color name; speaking the names of randomly alternating colors that correspond to the ink of clustered Xs; and speaking the names of randomly alternating colors that correspond to the ink of incongruent color names (e.g., the word "red" written in blue ink). A composite score called "Interference" may be computed based on a formula including scores from all three tasks, and this score was used for the analyses of the current study. The psychometric properties of the Stroop, including reliability and validity data, have been reported extensively, and a comprehensive discussion can be found in Golden (1978).

Wechsler Adult Intelligence Scale 3rd ed. (WAIS-III) Comprehension

This subtest requires respondents to answer 18 open-ended questions pertaining to commonsense judgment, practical reasoning, and the meaning of proverbs. Items are scored 0, 1, or 2 points depending on the item and how well the examinee is able to answer the questions. Potentially, scores on this measure could range from 0 to 33. Since only raw scores were available for the religiosity and moral reasoning measures, the raw score (RS) total for each participant on the Comprehension task was selected for the analyses of the current study (Wechsler 1997a, 1997b). Comprehension was used as a measure of social awareness and general reasoning abilities (Lezak 1995). The psychometric properties of the WAIS-III battery, including reliability and validity data, have been reported elsewhere extensively, and a comprehensive discussion can be found in Wechsler (1997a, 1997b).

WAIS-III Similarities

This subtest requires respondents to determine how 19 pairs of items are alike as the relationship between items grows more abstract. Items are scored 0, 1, or 2 points depending on the item and how well the examinee is able to describe the way that each pair of items is similar. Potentially, scores on this measure could range from 0 to 33. Since only raw scores were available for the religiosity and moral reasoning measures, the raw score (RS) total for each participant on

the Similarities task was selected for the analyses of the current study (Wechsler 1997a, 1997b), and will be used as measure of abstract reasoning (Goldstein and Green 1995; Lezak 1995).

Scriptural Literalism Scale

The Scriptural Literalism Scale (SLS), devised by Hogge and Friedman (1967), is a 16-item scale that assesses the degree to which an individual believes in a literal, God-inspired interpretation of the Bible. Respondents are required to rate their level of agreement with each statement according to a six-point Likert scale, ranging from "strongly disagree" to "strongly agree." Potentially, scores on this measure could range from 16 to 96. Split-half reliability coefficients reported by Hogge and Friedman (1967) and Jennings (1972) were all above 0.90. A Spearman-Brown reliability coefficient of 0.95 was also reported (Jennings 1972). Together, these values indicate a high level of interitem consistency for this measure.

Regarding validity, Jennings (1972) reported that the SLS was strongly correlated with McClean's (1952) Religious World View Scale ($r = 0.91$), moderately correlated with the Cognitive Salience portion of King and Hunt's (1975) Religious Position Scale ($r = 0.63$), and somewhat moderately correlated with the Extrinsic Religious Orientation portion of the Religious Position Scale ($r = 0.35$).

Quest Scale

Devised by Batson and Schoenrade (1991a, 1991b), the Quest Scale presents respondents with a series of 12 statements designed to assess their satisfaction with religious answers to existential questions. Respondents are required to mark their level of agreement with each item on a nine-point Likert-type scale ranging from "strongly agree" to "strongly disagree." Potentially, scores on this measure could range from 12 to 108. The Quest Scale, originally developed by Batson (1976), was revised by Batson, Schoenrade, and Ventis to measure "the degree to which an individual's religion involves an open-ended, responsive dialogue with existential questions raised by the contradictions and tragedies of life" (1993:169), as well as an appreciation for the complexities of these existential issues.

Regarding reliability estimates, Batson and Schoenrade (1991b) reported Cronbach's alphas of 0.75 and 0.81 in their two samples, and a test-retest reliability coefficient of 0.79. In addition to the review of the Quest Scale presented in the preceding section, validity information can also be found in Batson and Schoenrade (1991a, 1991b) and Burris (1999).

Defining Issues Test, 2nd ed. (DIT2)

The DIT2 (Rest and Narvaez 1998) is a shortened and revised version of the original DIT (Rest 1979), and consists of five moral dilemmas, each followed by 12 issue-questions that generally correspond to Kohlberg's six-stage moral reasoning paradigm. For each dilemma, the examinee's task is to identify and rank the four most important issue-questions (of the 12 provided) for each story's protagonist to consider when deciding how to solve his/her respective dilemma. The percentage of items (ranging from 0 to 100) listed in the top four rankings that appeal to Stage 5 and Stage 6 (i.e., postconventional) considerations constitutes the Postconventional Schema (P) score. This score was used as a measure of postconventional moral reasoning in the current study (Rest and Narvaez 1998).

The DIT2 offers the same scores as the original test (including P score), as well as an additional score, N2, which is similar to the P score but has added components to ensure greater validity and reliability. Though Rest and colleagues (1999) have suggested that the N2 score of DIT2 is slightly more powerful than the P score of both versions on validity and reliability criteria, the

P score was chosen for the current analyses, instead of N2, because it is a much more established and researched entity.

Procedure

Participants were given an appropriate consent form to read and sign in an office within St John's University's Center for Psychological Services and Clinical Studies (the Center). Upon completion of the consent form, participants were then administered either the religiosity measures, the DIT2 (Rest and Narvaez 1998), or the executive functioning measures. Participants were then administered the remaining measures in a random, counterbalanced fashion. Trained technicians who met an interrater reliability standard of 0.90 on practice trials before they administered measures to actual participants administered executive functioning measures. After participants completed each of the self-report measures of the protocol, they were responsible for placing the forms in a manila envelope outside the view of the examiner so that their responses to those measures would not affect the examiner's expectancies and judgments during the administration of subsequent measures. At the end of each completed administration, participants were debriefed regarding the purpose of the research and were offered an opportunity to learn about the study's results at a later date. Participants' data were coded to ensure confidentiality. All of the investigation's procedures adhered strictly to the ethical guidelines of the American Psychological Association (APA).

Results

Before conducting analyses, data were assessed to ensure that the assumptions of univariate (normality and linearity) and multivariate (homoscedasticity) statistics had been met. With the exception of age, which required a log transformation to ensure normality, no other variable required a data transformation or removal of outliers to meet statistical assumptions. All variables were also assessed qualitatively for patterns of missing data. Since missing data were judged to be randomly dispersed throughout the data set, missing values were replaced with the mean for each respective variable.

Univariate analyses included the computation of bivariate correlation coefficients for all variables with each other. Multivariate analyses, used to assess moderator effects, were conducted using sequential multiple regression. Before these analyses, data for all relevant predictors, moderators, and interaction terms were centered (Aiken and West 1991; Holmbeck 1997) to eliminate problems of multicolinearity between predictors and moderators with the interaction terms.

Sequential regression was employed to determine if the addition of executive functioning predictors, religiosity predictors, and the interaction of these variables improved prediction of postconventional moral reasoning beyond that of demographic data. For each sequential regression, demographic data, including age, gender, cumulative GPA, and college semesters attended, were entered into the regression equation first. Next, the executive functioning predictors were entered, including Stroop Interference (Golden 1978), Comprehension (Wechsler 1997a, 1997b), and Similarities (Wechsler 1997a, 1997b). Third, the religiosity predictors were entered, including, SLS (Hogge and Friedman 1967) and the Quest Scale (Batson and Schoenrade 1991a, 1991b). The interaction term between a given executive functioning measure and a given religiosity measure was entered last.

Separate regression analyses examined interaction terms to avoid problems of covariance between interaction terms. In sum, six interaction terms were examined, in six separate sequential regression analyses: Stroop Interference × SLS; Stroop Interference × Quest Scale; Comprehension × SLS; Comprehension × Quest Scale; Similarities × SLS; and Similarities × Quest Scale.

Initial Analyses

Descriptive Statistics

Table 1 displays the means and standard deviations for all variables, while Table 2 displays the correlations between these variables.

As shown in Table 2, semesters attended and cumulative GPA were significantly correlated with P score, as were all three executive functioning predictors: Stroop Interference, Comprehension, and Similarities. Among religiosity predictors, only the Quest Scale was significantly associated with P score. Comprehension was also significantly correlated with the Quest Scale, and a trend was observed between Similarities and the Quest Scale. In addition, it is important to note that SLS and the Quest Scale were significantly negatively correlated, as previously predicted. Though none of the bivariate correlations approached 0.80 (a common benchmark for assessing multicollinearity), variance inflation factors were assessed, to be conservative, since executive functioning predictors were highly correlated with each other, and multicollinearity can pose a significant problem in regression analyses. Variance inflation factors were all below

TABLE 1
DESCRIPTIVE STATISTICS: ENTIRE SAMPLE

Variable	*N*	*M*	*SD*	Range
Age	124	24.58	11.40	18–73
Number of college semesters attended	122	4.91	3.64	0–18
Cumulative GPA	113	3.23	0.48	2.0–4.0
Comprehension	124	21.23	4.58	10–31
Similarities	124	22.38	4.74	6–32
Stroop Interference	124	1.80	7.85	−17–27
Scriptural Literalism Scale	123	62.45	14.21	25–93
Quest Scale	123	60.08	17.54	23–98
P score	119	32.59	14.40	0–72

TABLE 2
INTERCORRELATIONS BETWEEN ALL PREDICTOR AND OUTCOME MEASURES

Measure	1	2	3	4	5	6	7	8	9	10
1. Age	–	−0.18*	0.31***	−0.04	−0.07	0.02	−0.05	0.03	−0.16	−0.08
2. Gender		–	−0.27**	0.24	−0.17	−0.07	−0.14	0.23*	−0.20*	0.00
3. Semesters			–	0.12	0.34**	0.27**	0.20*	−0.15	0.21*	0.23*
4. GPA				–	0.42**	0.28**	0.16	−0.03	0.26**	0.37***
5. Comprehension					–	0.62***	0.20*	−0.10	0.24**	0.51***
6. Similarities						–	0.26**	−0.03	0.17	0.53***
7. Stroop Int.							–	−0.10	0.05	0.20*
8. SLS								–	−0.32***	−0.06
9. Quest									–	0.25**
10. P Score				–						–

Note: $N = 123$. All significance tests are two-tailed.

*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

2.0, which, in conjunction with bivariate correlations being moderately below 0.80, suggested that multicollinearity between predictors was not a significant problem and did not need to be addressed.

Multivariate Analyses

Six separate sequential regressions were conducted (one for each respective interaction term), with P score as the outcome variable. Each sequential regression was identical through the first three steps, but in the fourth step a different interaction term was entered. Across all six sequential regressions the only interaction term that significantly improved the prediction model was Comprehension × Quest Scale. Since all of the regressions were identical except for the final step, only the sequential regression that included the Comprehension × Quest Scale interaction term, will be discussed in detail.

Table 3 displays the unstandardized regression coefficients (B), the standard error for each unstandardized regression coefficient, the standardized regression coefficients (β), and the change in R^2 for each step/model in this analysis.

As shown in Table 3a, the omnibus model was significant after each step, even though the change in R^2 was not significant at the end of each step. After Step 1, with only demographic predictors in the equation, $R^2 = 0.17$, $F_{inc}(4, 119) = 5.88$, $p < 0.001$. The addition of executive functioning predictors in Step 2 produced a significant change in R^2, $\Delta R^2 = 0.21$, $\Delta F\ (3, 116) = 12.67$, $p < 0.001$, and the omnibus model remained significant: $R^2 = 0.37$, $F_{inc}(7, 116) = 9.77$, $p < 0.001$. The addition of religiosity predictors in Step 3 did not produce a significant change in R^2, $\Delta R^2 = 0.01$, $\Delta F\ (2, 114) = 0.95$, $p < 0.40$, but despite this, the omnibus model still remained significant: $R^2 = 0.38$, $F_{inc}(9, 114) = 7.81$, $p < 0.001$. Finally, the addition of the interaction term Comprehension × Quest Scale in Step 4 produced a significant change in R^2, $\Delta R^2 = 0.03$, $\Delta F\ (1, 113) = 5.26$, $p < 0.05$, and the omnibus model maintained significance: $R^2 = 0.41$, $F_{inc}(10, 113) = 7.82$, $p < 0.001$. Examination of the standardized regression coefficients after Step 4 revealed that both Comprehension ($\beta = 0.22$) and Similarities ($\beta = 0.32$) had a significant relationship with P score after adjusting for all other predictors.

Simple effects of the significant interaction between Comprehension and the Quest Scale were assessed by examining the relationship between the Quest Scale and P score at the points 1 *SD*

TABLE 3
SUMMARY OF SEQUENTIAL REGRESSION ANALYSIS FOR P SCORE, INCLUDING COMPREHENSION × QUEST SCALE INTERACTION TERM: MODELS 1 AND 2 ($N = 123$)

	Model 1			Model 2		
Variable	*B*	*SE B*	β	*B*	*SE B*	β
Age	−62.42	43.48	−0.13	−51.11	0.09	−0.10
Gender	1.04	2.57	0.04	2.07	2.30	0.07
College semesters	0.91	0.35	0.23*	0.31	0.33	0.08
Cumulative GPA	9.43	2.60	0.31***	4.37	2.49	0.14
Comprehension				0.74	0.31	0.24*
Similarities				0.95	0.28	0.32**
Stroop Interference				0.07	0.14	0.04

Note: $R^2 = 0.17$ for Step 1; $\Delta R^2 = 0.20$ for Step 2 ($ps < 0.001$).
*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

Table 3A
SUMMARY OF SEQUENTIAL REGRESSION ANALYSIS FOR P SCORE, INCLUDING COMPREHENSION × QUEST SCALE INTERACTION TERM: MODELS 3 AND 4 ($N = 123$)

	Model 3			Model 4		
Variable	*B*	*SE B*	β	*B*	*SE B*	β
Age	−46.44	38.76	−0.09	−39.65	38.17	−0.08
Gender	2.61	2.36	0.09	2.33	2.32	0.08
College semesters	0.26	0.33	0.07	0.20	0.33	0.05
Cumulative GPA	3.66	2.54	0.12	3.39	2.50	0.11
Comprehension	0.72	0.32	0.23*	0.67	0.31	0.22*
Similarities	0.94	0.29	0.32**	0.95	0.28	0.32**
Stroop Interference	0.08	0.14	0.04	0.09	0.14	0.05
Scriptural Literalism	0.01	0.08	0.01	−0.02	0.08	−0.02
Quest Scale	0.09	0.07	0.11	0.07	0.07	0.08
Comprehension × Quest Scale				0.03	0.01	0.17*

Note: $\Delta R^2 = 0.01$ for Step 3; $\Delta R^2 = 0.03$ for Step 4 ($p < 0.05$).
*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

above and below the mean for Comprehension. For simplicity, the point 1 *SD* above the mean will be referred to as "high," and the point 1 *SD* below the mean will be referred to as "low." Multiple regression analysis (using uncentered variables) examined simple effects (Aiken and West 1991). The analysis revealed that the relationship between the Quest Scale and P score was significantly positive at high Comprehension, $\beta = 0.31$ ($SE = 0.09$), $t(115) = 2.83$, $p < 0.01$, but did not significantly differ from zero at low Comprehension, $\beta = -0.09$ ($SE = 0.10$), $t(115) = -0.74$, $p = 0.46$.

Exploratory Analyses

Gender Differences

Exploratory analyses examining gender differences were also performed on both predictor and outcome variables of the previous section. A one-way multivariate analysis of covariance (MANCOVA) was performed for gender on six dependent variables: Stroop Interference, Comprehension, Similarities, SLS, the Quest Scale, and P score. Three variables were entered as covariates: age, cumulative GPA, and college semesters attended. Analyses were employed to assure that assumptions of normality, linearity, homogeneity of variance, and multicollinearity were satisfactorily met. After adjusting for covariates, a significant effect of gender on SLS $F(1, 118) = 4.67$, $p < 0.05$, and the Quest Scale $F(1, 118) = 4.66$, $p < 0.05$ was observed. Table 4 displays the means and standard deviations for all variables, split by gender. As shown in Table 4, men scored significantly lower than women on SLS and significantly higher than women on the Quest Scale. Differences between men and women on all other dependent variables were not significant.

Discussion

Results of the current study generally supported the a priori hypotheses, except for analyses involving the relationship between scriptural literalism and postconventional moral reasoning.

TABLE 4
DESCRIPTIVE STATISTICS: SPLIT BY SEX

	Males ($N = 44$)		Females ($N = 79$)	
Variable	*M*	*SD*	*M*	*SD*
Age	26.55	12.57	23.50	10.63
College semesters attended	6.20	3.89	4.20	3.26
Cumulative GPA	3.21	0.43	3.23	0.48
Comprehension	22.30	4.42	20.64	4.58
Similarities	22.80	4.52	22.15	4.86
Stroop Interference	3.30	8.08	0.97	7.64
SLS*	58.16	14.55	64.84	13.53
Quest Scale*	64.80	18.82	57.46	16.32
P score	32.52	14.96	32.62	14.19

*Indicates $p < 0.05$ on this measure in MANCOVA analysis comparing males and females, after controlling for age, cumulative GPA, and college semesters attended.

Components of executive functioning emerged as significant predictors of postconventional moral reasoning, and this is one of the central findings of the current study. The relationship between executive functioning and moral reasoning has been documented theoretically (Eslinger 1996; Goldberg 2001), as well as in case studies (Eslinger et al. 1992), but as far as we know the emergence of executive functioning components as significant predictors of postconventional moral reasoning is a novel finding within the context of a mid-sized empirical study.

Results of the exploratory analyses underscored the relative importance of executive functioning components in the prediction of postconventional moral reasoning. Despite significant differences between men and women on *both* religiosity measures (men were significantly more likely than women to engage in quest, and significantly less likely to engage in scriptural literalism), these differences were not associated with corresponding differences in P score. Nonsignificant differences between men and women were observed for P score and all measures of executive functioning, and this provides additional support for the predictive strength of executive functioning on postconventional moral reasoning.

In the current study, all measures of executive functioning predicted postconventional moral reasoning at the bivariate level, and two measures, Similarities (used to assess abstract reasoning) and Comprehension (used to assess social awareness and general reasoning) significantly predicted postconventional moral reasoning after accounting for covariates and other predictors in the sequential regression analyses. Regarding aspects of religiosity, quest was positively correlated with postconventional moral reasoning, and this is consistent with earlier findings (Glover 1997; Sapp and Jones 1986). Quest was also significantly correlated with Comprehension, and trended toward a significant correlation with Similarities. In addition, the relationship between quest and postconventional moral reasoning was moderated by Comprehension. Specifically, the results demonstrated that for individuals with high scores on Comprehension, engagement in quest was significantly and positively associated with postconventional moral reasoning, but for those scoring low on Comprehension, no significant relationship between quest and postconventional moral reasoning was observed. These findings suggest that greater engagement in quest may increase the likelihood of postconventional schema use among those with greater social awareness and reasoning skills.

In spite of the findings discussed above, it is disappointing that scriptural literalism did not emerge as a significant predictor of postconventional moral reasoning. The finding, however, that

scriptural literalism was significantly negatively correlated with quest was not only consistent with a priori hypotheses, but also partially validates the respective scales measuring these constructs. Scriptural literalism and quest are diverging dimensions of religiosity, as quest reflects the ability to resist dogmatic religious answers to existential questions, which often derive from a literal interpretation of the scriptures.

Implications

Insofar as the measures used in the current study assess the constructs they purport to measure, the results suggest that quest, along with abstract reasoning, social awareness, and to a lesser degree, cognitive flexibility are significant predictors of postconventional moral reasoning and are significantly associated with each other. There is tremendous room for speculation, however, about how these findings relate to more tangible aspects of morality, religiosity, and cognition. It is possible that components of executive functioning may be responsible for the ways that individuals understand and organize their respective religious teachings and apply them to moral contexts. More specifically, components of executive functioning may be involved in how individuals negotiate the dynamic between the guiding principles of their religion and the specific laws that emanate from those principles.

Whereas religious *laws* tend to be concrete, fixed, and precise, the *principles* underlying them are more abstract, flexible, and ambiguous. At first, it may seem easier to rely on precise, concrete religious laws for moral guidance instead of flexible, abstract religious principles. But there are two problems with relying solely on laws without attending to their underlying principles. First, as Clouse (1986:17) suggests, "the Scriptures do not always agree on what God has said," as numerous inconsistencies can be found when a literal interpretation of the Bible is conducted. Second, religious laws, much like civil laws, are vulnerable to loopholes that violate the spirit of those laws (i.e., the principles underlying them). Hence, an understanding of the principles that underlie even the most straightforward laws is necessary. Results from the present study suggest that the ability to understand and apply abstract concepts (possibly including religious principles) may depend on the same skills (i.e., components of executive functioning) necessary for postconventional moral reasoning.

When interpreting the results of the present study, it is important to remember that this investigation was limited to Christian participants, who may differ qualitatively from members of other faiths in the ways they experience and grow within their religion. In contrast to Buddhists, for example, who tend to view their scriptures and written teachings as secondary to personal experience and empirical testing, Christians generally place significant value on their scriptures, regardless of whether they believe in the Bible as the literal or inspired word of God. Hence, Christians who score high on measures like the Quest Scale may be further outside the mainstream of their own faith than Buddhist counterparts achieving the same score.

Given the findings of the current study, there is a major caveat that needs to be addressed. The current study focused on moral reasoning, which has been shown in some cases to be distinct from moral behavior. Hence, the results of the current study may not generalize to actual moral behavior. Highlighting this distinction is an earlier study by Guttmann (1984) involving sixth-grade pupils from secular and Jewish schools in Israel. In that study, students attending a Jewish day school scored higher than their secular counterparts on a measure of moral reasoning (the Morality Test for Children; Ziv 1976), but engaged in significantly more acts of cheating, a gauge of "actual moral behavior" (1976:249) used in that study.

One possible reason for this rift is that while children may have the cognitive skills necessary to memorize religious teachings, and may know how to apply them in a single context, they may not have the cognitive (i.e., executive) abilities to recognize how those teachings should be applied in their own lives or in different contexts. Apropos of this hypothesis is Heubner and Garrod's

(1993:173) summary of the training practices and traditions of Buddhist monks. During their qualitative investigation, the authors discovered that for Buddhists:

> Transmission of knowledge is based on the notion that a young mind is best suited for absorbing data, as only an older mind is capable of reflection or critical thought. A young monk's life is therefore dedicated to memorizing Tibetan scripture so that when he is older he will be able to contemplate and understand the words he has carried with him since boyhood. Thus in late adolescence (17 to 18 years of age) the curriculum changes. Memorizing is kept to a minimum and one begins a critical study of Buddhist philosophy and debating the texts.

Interestingly, it is approximately at age 18 that the neural circuits and brain structures often associated with executive functioning (e.g., structures and white matter fiber tracts within the prefrontal cortex) fully mature (Goldberg 2001).

Limitations

Since the current study was correlational in design (i.e., no variables were manipulated), the findings thereof must be qualified accordingly. Hence, inferences about causation regarding the influence of either executive functioning or religiosity on moral reasoning cannot be made.

A second limitation is that both of the religiosity measures used in the current study were self-report in design: No aspect of religiosity was measured objectively with reference to a specific criterion. As such, social desirability may have influenced participant responses on these measures, and should be accounted for in future studies.

A final limitation is that two of the three measures assessing executive functioning were WAIS-III subtests (i.e., Similarities and Comprehension), and are classic measures of crystallized intelligence (gC), which tends to correlate with myriad socioeconomic factors. As such, socioeconomic factors should have been assessed, if not controlled. In addition, the degree to which Similarities and Comprehension assess components of "executive functioning," as opposed to verbal or crystallized intelligence, is unclear given the evolving/revolving models of executive functioning in the neuropsychology literature. This is not just a limitation of the *current* study, it is also a general limitation of all research involving executive functioning.

Future Directions

Over the past decade, findings from the neuroimaging literature suggest that emotional factors may play an important yet complex role in the relationship between moral reasoning and aspects of cognitive/executive functioning. In a recent functional neuroimaging study, Bishop et al. (2004) reported that increased state anxiety is associated with attenuated recruitment of the anterior cingulate cortex and lateral prefrontal cortex, two brain regions that are frequently linked with executive functioning. In a similar study, Greene et al. (2001) found that both response time and activation of various brain regions (i.e., the medial frontal gyrus, posterior cingulate gyrus, and angular gyrus, bilateral) significantly increased when participants were responding to moral dilemmas with high emotional and personal salience than to dilemmas with low emotional and personal salience. In addition, participants' responses to the presented moral dilemmas also differed across conditions. Integrating these findings, it is possible, as suggested by Bishop and colleagues, that emotional factors may increase competition for resources within the brain, making certain regions (e.g., the anterior cingulate, lateral prefrontal cortex, and other brain structures responsible for executive functioning) susceptible to underperformance.

Based on these findings, it seems reasonable to speculate that in conjunction with executive functioning, emotional factors may also moderate the relationship between religiosity and moral reasoning. Moreover, it is possible that emotional factors may be responsible for the occasionally observed gap between moral reasoning and moral behavior reported by Guttmann (1984). Hence,

an examination of emotional factors should be included in subsequent investigations of moral reasoning and behavior.

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References

Aiken, L. S. and S. G. West. 1991. *Multiple regression: Testing and interpreting interactions*. Newbury Park, CA: Sage.

Allport, G. W. 1966. The religious context of prejudice. *Journal for the Scientific Study of Religion* 5:448–51.

Allport, G. W. and J. M. Ross. 1967. Personal religious orientation and prejudice. *Journal of Personality and Social Psychology* 5:432–43.

Batson, C. D. 1976. Religion as prosocial: Agent or double agent? *Journal for the Scientific Study of Religion* 15:29–45.

Batson, C. D. and L. Raynor-Prince. 1983. Religious orientation and complexity of thought about existential concerns. *Journal for the Scientific Study of Religion* 22:38–50.

Batson, C. D. and P. A. Schoenrade. 1991a. Measuring religion as quest: I. Validity concerns. *Journal for the Scientific Study of Religion* 30:416–29.

——. 1991b. Measuring religion as quest: II. Reliability concerns. *Journal for the Scientific Study of Religion* 30:430–47.

Batson, C. D., P. A., Schoenrade, and W. L. Ventis. 1993. *Religion and the individual: A social-psychological perspective*. New York: Oxford University Press.

Batson, C. D. and W. L. Ventis. 1982. *The religious experience: A social-psychological perspective*. New York: Oxford University Press.

Brown, D. M. and L. Annis. 1978. Moral development level and religious behavior. *Psychological Reports* 43:1230.

Bishop, S., J. Duncan, M. Brett, and A. D. Lawrence. 2004. Prefrontal cortical function and anxiety: Controlling attention to threat-related stimuli. *Nature Neuroscience* 7:184–88.

Burris, C. T. 1999. Quest scale. In *Measures of religiosity*, edited by P. C. Hill and R. W. Hood Jr. Birmingham, AL: Religious Education Press.

Burris, C. T., L. M. Jackson, W. R. Tarpley, and G. J. Smith. 1996. Religion as quest: The self-directed pursuit of meaning. *Personality and Social Psychology Bulletin* 22:1068–76.

Cady, M. 1982. Assessment of moral development among clergy in Bloomington. Unpublished manuscript, Augsberg College, Minneapolis, MN.

Clouse, B. 1979. Moral judgment of teacher education students as related to sex, politics and religion. Unpublished manuscript, Indiana State University, Terre Haute.

——. 1985. Moral reasoning and Christian faith. *Journal of Psychology & Theology* 13:190–98.

——. 1986. Church conflict and moral stages: A Kohlbergian interpretation. *Journal of Psychology & Christianity* 5:14–19.

Cottone, J. G. 2005. Moral reasoning, executive functions, and aspects of religiosity. *Dissertation Abstracts International: Section B: The Sciences and Engineering* 66(3):1711.

Denckla, M. B. 1996. A theory and model of executive function: A neuropsychological perspective. In *Attention, memory, and executive function*, edited by G. R. Lyon and N. A. Krasnegor. Baltimore, MD: Paul H. Brookes Publishing Co.

Donahue, M. J. 1985. Intrinsic and extrinsic religiousness: Review and meta-analysis. *Journal of Personality & Social Psychology* 48:400–19.

Elliot, R. 2003. Executive functions and their disorders. *British Medical Bulletin* 65:49–59.

Emler, N., S. Resnick, and B. Malone. 1983. The relationship between moral reasoning and political orientation. *Journal of Personality and Social Psychology* 45:1073–80.

Ernsberger, D. J. 1977. Intrinsic-extrinsic religious identification and level of moral development. *Dissertation Abstracts International: Section B: The Sciences and Engineering* 37:6302B.

Ernsberger, D. J. and G. J. Manaster. 1981. Moral development, intrinsic/extrinsic religious orientation and denominational teachings. *Genetic Psychology Monographs* 104:23–41.

Eslinger, P. J. 1996. Conceptualizing, describing, and measuring components of executive function: A summary. In *Attention, memory, and executive function*, edited by G. R. Lyon and N. A. Krasnegor. Baltimore, MD: Paul H. Brookes Publishing Co.

Eslinger, P. J., L. M. Grattan, H. Damasio, and A. R. Damasio. 1992. Developmental consequences of childhood frontal lobe damage. *Archives of Neurology* 49:764–69.

Getz, I. R. 1984. Moral judgment and religion: A review of the literature. *Counseling & Values* 28:94–116.

Glover, R. J. 1997. Relationships in moral reasoning and religion among members of conservative, moderate, and liberal religious groups. *Journal of Social Psychology* 137:247–55.

Goldberg, E. 2001. *The executive brain: Frontal lobes and the civilized mind*. New York: Oxford University Press.

Golden, C. J. 1978. *Stroop color and word test: A manual for clinical and experimental uses*. Chicago, IL: Stoelting Company.

Goldstein, F. C. and R. C. Green. 1995. Assessment of problem solving and executive functions. In *Clinical neuropsychology assessment: A cognitive approach*, edited by R. L. Mapou and J. Spector. New York: Plenum Press.

Greene, J. D., R. B. Sommerville, L. E. Nystrom, J. M. Darley, and J. D. Cohen. 2001. An fMRI investigation of emotional engagement in moral judgment. *Science* 239:2105–08.

Groth-Marnat, G. 1999. *Handbook of psychological assessment,* 3rd ed. New York: Wiley.

Guttmann, J. 1984. Cognitive morality and cheating behavior in religious and secular school children. *Journal of Educational Research* 77:249–54.

Harris, A. T. 1981. A study of the relationship between stages of moral development and the religious factors of knowledge, belief and practice in Catholic high school adolescents. *Dissertation Abstracts International: Section B: The Sciences and Engineering* 42:638–39B.

Heubner, A. M. and A. C. Garrod. 1993. Moral reasoning among Tibetan monks: A study of Buddhist adolescents and young adults in Nepal. *Journal of Cross-Cultural Psychology* 24:167–85.

Hilfer, A. E. 1980. Abstract reasoning and temporal stability in assessments of moral judgment in religious schools. *Dissertation Abstracts International: Section B: The Sciences and Engineering* 41:1483.

Hogge, J. H. and S. T. Friedman. 1967. The scriptural literalism scale: A preliminary report. *Journal of Psychology: Interdisciplinary & Applied* 66:275–79.

Holmbeck, G. N. 1997. Toward terminological conceptual, and statistical clarity in the study of mediators and moderators: Examples from the child-clinical and pediatric psychology literatures. *Journal of Consulting and Clinical Psychology* 65:599–610.

Jennings, F. L. 1972. A note on the reliability of several belief scales. *Journal for the Scientific Study of Religion* 11:157–64.

Killeen, C. D. 1978. The relationship between cognitive levels of thinking and levels of moral judgment as compared in adolescents 12–18 in Catholic and public schools. *Dissertation Abstracts International: Section B: The Sciences and Engineering* 38:6621A.

Kohlberg, L. 1981. *Essays of moral development, Volume 1. The philosophy of moral development: Moral stages and the idea of justice*. San Francisco, CA: Harper & Row.

Lawrence, J. A. 1979. The component procedures of moral judgment-making. *Dissertation Abstracts International: Section B: The Sciences and Engineering* 40:896B.

Lezak, M. D. 1995. *Neuropsychological Assessment,* 3rd ed. New York: Oxford University Press.

MacLeod, C. M. 1991. Half a century of research on the Stroop effect: An integrative review. *Psychological Bulletin* 109:163–203.

McClean, M. 1952. Religious world views. *Motives* 12:22–26.

Moran, J. D. and M. S. Jennings 1983. Moral judgments in parochial and public school second-graders. *Psychological Reports* 52:579–85.

Narvaez, D., I. Getz, J. R. Rest, and S. J. Thoma 1999. Individual moral judgment and cultural ideologies. *Developmental Psychology* 35:478–88.

O'Gorman, T. P. 1979. An investigation of moral judgment and religious knowledge scores of Catholic high school boys from Catholic and public schools. *Dissertation Abstracts International: Section B: The Sciences and Engineering* 40:1365.

Paloutzian, R. F. 1983. *Invitation to the psychology of religion*. Glenview, IL: Scott, Foresman.

Pennington, B. F. 1997. Dimensions of executive functions in normal and abnormal development. In *Development of the prefrontal cortex: Evolution, neurobiology, and behavior*, edited by N. A. Krasnegor, G. R. Lyon, and P. Goldman-Rakic. Baltimore, MD: Paul H.Brooks Publishing.

Pennington, B. F. and S. Ozonoff 1996. Executive functions and developmental psychopathology. *Journal of Child Psychology and Psychiatry* 37:51–87.

Rest, J. R. 1979. *Revised manual for the defining issues test*. Minneapolis, MN: Moral Research Projects.

Rest, J. R. and D. Narvaez 1998. Guide for DIT2. Unpublished manuscript, Minneapolis.

Rest, J. R., D. Narvaez, S. J. Thoma, and M. J. Bebeau. 1999. DIT2: Devising and testing a revised instrument of moral judgment. *Journal of Educational Psychology* 91:644–59.

Salthouse, T. A. 2005. Relations between cognitive abilities and measures of executive functioning. *Neuropsychology* 19:532–45

Sandel, M. 1982. *Liberalism and the limits of justice*. Cambridge, UK: Cambridge University Press.

Sanderson, S. K. 1974. Religion, politics, and morality: An approach to religious and political belief systems and their relation through Kohlberg's cognitive-developmental theory of moral judgment. *Dissertation Abstracts International: Section B: The Sciences and Engineering* 34:6259.

Sapp, G. L. and L. Jones. 1986. Religious orientation and moral judgment. *Journal for the Scientific Study of Religion* 25:208–14.

Sharfman, B. N. 1974. Creative thinking and religious training in relation to moral judgment. *Dissertation Abstracts International: Section B: The Sciences and Engineering* 34:7595a–96a.

Stuss, D. T. and M. P. Alexander. 2000. Executive functions and the frontal lobes: A conceptual view. *Psychological Research* 63:289–98.

Tranel, D., S. W. Anderson, and A. Benton. 1994. Development of the concept of "executive function" and its relationship to the frontal lobes. In *Handbook of neuropsychology*, edited by F. Boller and J. Grafman, Vol. 8, pp. 125–48. Amsterdam: Elsevier.

Troyer, A. K., R. E. Graves, and K. M. Cullum. 1994. Executive functioning as a mediator of the relationship between age and episodic memory in healthy aging. *Aging and Cognition* 1:45–53.

Wahrman, I. S. 1981. The relationship of dogmatism, religious affiliation, and moral judgment development. *Journal of Psychology: Interdisciplinary & Applied* 108:151–54.

Walzer, M. 1983. *Spheres of justice*. New York: Basic Books.

Watson, P. J., R. J. Morris, and R. W. Hood, Jr. 1989. Interactional factor correlations with means and end religiousness. *Journal for the Scientific Study of Religion* 28:337–47.

Wechsler, D. A. 1997a. *WAIS-III administration and scoring manual*. San Antonio: Psychological Corporation.

——. 1997b. *WAIS-III/WMS-III technical manual*. San Antonio: Psychological Corporation.

Wulf, D. M. 1997. *Psychology of religion*: *Classic and contemporary*. New York: Wiley.

Ziv, A. 1976. Measuring aspects of morality. *Moral Education* 5:189–201.