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ORIGINAL PAPER

Reliability and Validity of the Brief Multidimensional Measure of Religiousness/Spirituality Among Adolescents

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Abstract *Background* Developed for use in health research, the Brief Multidimensional Measure of Religiousness/Spirituality (BMMRS) consists of brief measures of a broad range of religiousness and spirituality (R/S) dimensions. It has established psychometric properties among adults, but little is known about its appropriateness for use with adolescents. *Purpose* We assessed the psychometric properties of the BMMRS among adolescents. *Method* We recruited a racially diverse (85% non-White) sample of 305 adolescents aged 12–18 years (median 16 yrs, IQR 14–17) from 3 urban medical clinics; 93 completed a retest 1 week later. We assessed internal consistency and test–retest reliability.

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We assessed construct validity by examining how well the measures discriminated groups expected to differ based on self-reported religious preference, and how they related to a hypothesized correlate, depressive symptoms. Religious preference was categorized into "No religion/Atheist" (11%), "Don't know/Confused" (9%), or "Named a religion" (80%). *Results* Responses to multi-item measures were generally internally consistent (alpha $\geq$0.70 for 12/16 measures) and stable over 1 week (intraclass correlation coefficients $\geq$0.70 for 14/16). Forgiveness, Negative R/S Coping, and Commitment items showed lower internal cohesiveness. Scores on most measures were higher ($p < 0.05$) among those who "Named a religion" compared to the "No religion/Atheist" group. Forgiveness, Commitment, and Anticipated Support from members of one's congregation were inversely correlated with depressive symptoms, while BMMRS measures assessing negative R/S experiences (Negative R/S Coping, Negative Interactions with others in congregation, Loss in Faith) were positively correlated with depressive symptoms. *Conclusions* These findings suggest that most BMMRS measures are reliable and valid for use among adolescents.

Keywords Religiousness · Spirituality · Adolescents · Measures · Reliability · Validity

Introduction

Interest in the effects of religious involvement and spirituality on adolescent health has grown dramatically in recent years as part of an increasing focus on factors that promote youth well-being and resilience (Benson et al. 2005; Crawford et al. 2006; Fergus and Zimmerman 2005; King and Furrow 2004). The extant body of research on religiousness/spirituality (R/S) and adolescent health is still relatively limited, however, compared to the conceptual and empirical work done in adults (Hill and Hood 1999; Koenig et al. 2001; Plante and Sherman 2001; Spilka et al. 2003). Recent reviews of the literature conducted by Rew and Wong (2006), Cotton et al. (2006), and Weaver et al. (2000) have found that the great majority of adolescent studies to date have tended to use "distal" measures of religiosity, such as frequency of religious service attendance and religious affiliation, or single global items to assess religiousness or religious importance (e.g., "How religious are you?" or "How important is religion in your life?"). These studies yield little information about *how* or *why* religious involvement affects adolescent health and behaviors, because they give little indication of the internal motivations, expectations, and cognitive processes that comprise adolescents' R/S experience, and of how R/S shapes their view of themselves and the events in their lives, and their interaction with others. In adult studies, these operational or "functional" aspects of R/S (e.g., religious/spiritual coping, forgiveness, connection to one's religious community, etc.) and their relation to health have been the focus of intense study because they are thought to have a more direct influence on an individual's health and behavior (Gorsuch and Miller 1999; Koenig et al. 2001; Krause 1997; Pargament et al. 2000; Plante and Sherman 2001; Sherman and Simonton 2001; Underwood and Teresi 2002). Moreover, it has long been acknowledged within the adult literature that R/S consists of different dimensions that should be examined separately because they may have varying levels of salience for a particular health area, or may have different, possibly even negative, effects on health (Hill and Pargament 2003; Idler et al. 2003; Pargament et al. 1998; Sherman and Simonton 2001; Tsang and McCullough 2003).

Studies that assess multiple R/S constructs among adolescents are still relatively rare (Cotton et al. 2005; D'Onofrio et al. 1999; Holder et al. 2000; Knight et al. 2007;

Nonnemaker et al. 2003; Pearce et al. 2003a, b), but such studies are needed to deepen our understanding of the nature of R/S among adolescents, how it develops or changes with age, and which aspects are most predictive of health and behavior (Benson et al. 2005). To conduct these studies, measurement tools are required that (1) can separately assess multiple domains of R/S deemed most relevant to health research, (2) are brief and can feasibly be included in data collection when a wide range of topics must be covered, and (3) have demonstrated reliability and validity.

One such tool is the Brief Multidimensional Measure of Religiousness/Spirituality (BMMRS), the product of a national expert working group convened in 1995 by the Fetzer Institute and the National Institute on Aging (FI/NIA) with the specific aim of developing an assessment tool suitable for use in health research (Fetzer Institute/National Institute on Aging Working Group 1999). Drawing from a long history of conceptual and measurement work done in adults by R/S scholars, the working group developed the BMMRS by compiling a set of brief measures assessing both distal R/S domains (e.g., Organizational Religiousness, Religious Affiliation, etc.) and functional R/S domains (Cotton et al. 2006) (e.g., Forgiveness, Religious/Spiritual Coping) believed to be most proximal to health. The BMMRS, or portions of it, has since been used in numerous studies of adults including the national 1998 General Social Survey (GSS) (Idler et al. 2003; Shahabi et al. 2002; The Fetzer Institute and Kercher Center for Social Research; Underwood and Teresi 2002), and has established psychometric properties among adults. However, little is known about its psychometric properties among adolescents since it has yet to be extensively used in this population. The few prior studies that utilized the BMMRS among adolescents (Knight et al. 2007; Pearce et al. 2003a, b; Walker et al. 2007), including one conducted by the current authors, provide limited psychometric information (primarily internal consistency reliability only and no assessment of validity), often on just a subset of BMMRS scales, since a more comprehensive evaluation was not the focus of these studies.

The aim of the current study was to conduct a more thorough psychometric analysis of the BMMRS among adolescents aged 12–18 years than that carried out in previous studies. Specifically, we assessed reliability by evaluating both response consistency across items that were intended to measure the same construct (internal consistency reliability) and response stability over time (test–retest reliability). In addition, we evaluated construct validity by comparing responses across groups of adolescents expected to differ based on self-reported religious preference (known-groups validity), as well as by examining the level of association between the BMMRS measures and a health indicator, depressive symptoms, which has been found in previous studies to have a negative association with some R/S measures (Cotton et al. 2005; Koenig et al. 2001; McCullough and Larson 1999; Pearce et al. 2003b; Wong et al. 2006) (convergent validity).

Method

Participants

We recruited a convenience sample of 305 adolescents aged 12–18 years from three large, hospital-based, adolescent primary care clinics in Boston, MA. These sites have diverse patient populations, including youth from urban and suburban communities, different racial/ethnic groups, and across socioeconomic strata. Sample recruitment occurred between May 2001 and April 2002, using methods described in detail in a prior article (Knight et al. 2007) and summarized briefly here. At two of the three sites, research

assistants identified all age-eligible patients from among scheduled appointments and invited these patients to participate while in the waiting rooms. At the third site, health care providers invited all age-eligible patients at the conclusion of the medical visits. Some age-eligible patients were excluded due to an inability to read or understand English ($n = 14$) or presence of an urgent medical or psychiatric problem that precluded research participation that day ($n = 18$). Research assistants explained the study's purpose and procedures to all interested and eligible patients, and obtained signed youth assent from those agreeing to participate, as well as parent consent by phone or in person for youth under 18 years. Those youth under 18 whose parents could not be reached were not allowed to participate ($n = 16$). Prospective participants were informed that their decision about participation would have no impact on their medical care, that their answers to study questions would be kept confidential, and that if a serious health risk was identified, the research team would notify the participant's doctor so that necessary care could be arranged, and this could include notifying their parents.

Procedures

While in the clinic, each participant completed a questionnaire which included the BMMRS, the Beck Depression Inventory-II (BDI-II) (Beck et al. 1996), and socio-demographic items. Participants took approximately 45 min to complete the questionnaire and were compensated with a $25 gift certificate for a local store.

Participants were invited to return to clinic for a retest one week later. Out of the 143 who initially agreed and were available to return, 93 participants (65%) completed the retest. We used unique numeric identification codes to link test–retest data for each participant. Retest participants received a second $25 gift certificate. The institutional review boards of the three sites approved this study protocol.

Measures

Socio-demographic Characteristics

We collected gender, age, race/Hispanic ethnicity, parents' highest education level as a proxy for socioeconomic status (SES), and self-reported school grades in core subjects as a proxy for academic ability.

Brief Multidimensional Measure of Religiousness/Spirituality

The domains and items in the BMMRS are explained in detail in the FI/NIA Working Group Report (1999) and are thus described only briefly here. We administered the BMMRS nearly in its entirety and chose to include the long forms of measures when they were available. We administered a 15-item long form of the *Daily Spiritual Experiences Scale* (DSES) (Underwood and Teresi 2002), which characterizes spirituality, i.e., an individual's inner experience of, and interaction or involvement with, the transcendent (God, the Divine, a Higher Power) during daily life. We combined two items from the original 16-item scale to create a single "I find strength and comfort in my religion or spirituality," as recommended by the authors (Underwood and Teresi 2002), and included

the two separate items "I feel God's love for me directly" and "I feel God's love for me through others" rather than the combined single item "I feel God's love for me directly or through others" that is part of the short form. The response formats included a 6-point scale ranging from 1 = "Never or almost never" to 6 = "Many times a day" for 14 items, and a 4-point scale from 1 = "Not at all close" to 4 = "As close as possible" for the closeness to God item. We scored the DSES, as with all BMMRS measures, to have higher scores for greater experience so as to have consistency in score interpretation across all domains.

We also included the long forms for the *R/S Coping* and *Religious Support* domains. The R/S Coping measure examines the frequency of use of different types of religious/spiritual coping methods to deal with stressful life events (Pargament et al. 2000). The long form consists of 5 items assessing positive coping methods that involve turning toward a divine power in stressful moments (e.g., "I look to God for strength, support, and guidance in crises"), 5 negative items assessing the presence of an internal struggle with God, or of potentially destructive beliefs about God's role in stressful life events (e.g., "I feel that stressful situations are God's way of punishing me for my sins or lack of spirituality"), and a single Overall R/S Coping item ("To what extent is your religion involved in understanding or dealing with stressful situations in any way?"). All items had a 4-point response scale ranging from 1 = "Not at all" to 4 = "A great deal" (for the Overall R/S Coping item, 1 = "Not involved at all" to 1 = "Very involved"). The Religious Support domain assesses perceptions about a person's relationships with others in his/her "congregation" or shared place of worship, and consists of four subscales, each with three items in the long form. These include "Emotional Support Received from Others," "Emotional Support Provided to Others," "Negative Interaction," and "Anticipated Support." All items had the same 4-point response scale (1 = "None/Not at all" to 4 = "A great deal"). Respondents were instructed to check "None" or "Not at all" if they did not have a congregation.

For the remaining BMMRS measures, we included either the short form or the single version available. *Belief* in a higher power, a central tenet of many religious/spiritual traditions was assessed with one item: "I believe in a God who watches over me." *Meaning*, the attribution of a divine purpose to one's life, was assessed with 2 items: "The events in my life unfold according to a divine or greater plan" and "I have a sense of mission or calling in my own life." Both Belief and Meaning had 4-point response scales which ranged from 1 = "Strongly disagree" to 4 = "Strongly agree." *Forgiveness* was assessed using three items, frequency of having forgiven oneself, having forgiven others, and knowing that one is forgiven by God, with a 4-point response scale from 1 = "Never" to 4 = "Always/Almost always." The *Private Religious Practices* domain, which characterizes personal religious behaviors that are "non-organizational" and "informal," included five items: frequency of private prayer, meditation, watching or listening to religious programs on TV or radio, reading the Bible or other religious literature, and saying prayers before or after meals in the home. The first four items had an 8-point response scale (1 = "Never" to 8 = "More than once a day"), while the last item had a 5-point scale (1 = "Never" to 5 = "At all meals").

The *R/S History* domain consists of items that assess whether, and at what ages, significant religious/spiritual experiences occurred in an individual's life. These include any life-changing R/S experience, significant gain in faith, or significant loss in faith. *Commitment*, a measure of the level of importance of R/S in people's lives, consisted of three items: the degree to which religious beliefs affect all other dealings in one's life (1 = "Strongly disagree" to 4 = "Strongly agree" scale), the household's average monthly monetary contribution to a congregation or other religious causes, and the average number of hours per week spent in activities that are done for religious or spiritual reasons.

The final three domains consist of the commonly used "distal" measures of religiosity, including *Organizational Religiousness* (two items on frequency of religious service attendance and of participation in other activities at a place of worship, with a 6-point response scale from 1 = "Never" to 6 = "More than once a week"), *Religious Preference* (1 item each on the adolescents' own and their parent's religious preference); and global *Self-Ranking* of one's overall level of religiosity and spirituality (2 items: "To what extent do you consider yourself a religious [spiritual] person?" with a 4-point response scale ranging from 1 = "Not religious [spiritual] at all" to 4 = "Very religious [spiritual]").

Depressive Symptoms

The BDI-II (Beck et al. 1996) is a widely used tool with established reliability ($\alpha = 0.84$ in the current study) and validity for assessing severity of depressive symptoms among adolescents and adults. For each of 21 items on the BDI-II, respondents chose from four statements the best one that described how they were feeling during the past two weeks. Item scores were then summed to generate an overall score.

Data Analysis

All analyses were conducted using SPSS v.14.0®. To describe our sample, response frequencies were generated for all sociodemographic items and selected religious characteristics. Written responses to the open-ended Religious Preference items were independently reviewed and coded by two authors, and disagreements resolved by a third author. We constructed a 4-category typology of religiousness/spirituality (neither religious nor spiritual, religious only, spiritual only, and both religious and spiritual) from the self-ranking variables, with individuals answering "very" or "moderately" being categorized as religious and/or spiritual.

We conducted all analyses adhering to the domain and scale structure conceptualized by the developers of the original measures. We reverse-coded item scores where necessary so that higher scores always indicated greater frequency, experience, agreement, or use of a coping strategy, etc. We analyzed the positive and negative items of the R/S Coping domain as separate scales, as recommended by Idler et al. (2003). Responses to the Commitment item on hours per week spent on church or other religious/spiritual activities were collapsed into four categories due to a highly skewed frequency distribution: 0 (47.5%), 1–2 (20.7%), 3–4 (16.5%), and 5+ (15.3%). The Commitment item on monthly household financial contribution to a congregation or other religious causes was dropped from all analyses due to missing data for half of all respondents.

We generated the appropriate descriptive statistics, depending on the type of response distribution, for each BMMRS scale (i.e., mean and standard deviation, median and interquartile range, sample proportion and 95% confidence interval). For all multi-item BMMRS domains, we computed overall scale scores, and subscale scores where applicable, which were sum totals of the individual item scores. In calculating scale scores, we applied an 80% completion rule for measures consisting of at least 5 items, a 75% rule for 4 items, and for measures with 3 or fewer items, all items needed to be answered in order for a sum score to be computed. If a respondent had some missing data but met the completion rule for a domain or subscale, we adjusted for the number of completed items by multiplying the sum of the scores to their answered items by the total number of items in that scale, and then dividing the product by the number of items they actually answered.

This in effect replaced missing item responses with the mean score on the answered items (mean substitution). Subsequently, rates of missing data were low (<5%) for the vast majority of BMMRS measures. Missing data rates were slightly higher for the Daily Spiritual Experiences (7%) and Meaning (6%) domains, possibly due to respondent fatigue as these items appeared toward the end of the questionnaire, and were much higher for Religious Preference (13%) and the Commitment item on the hours per week spent in R/S activities (21%), both of which had write-in response formats. Finally, a score distribution was deemed significantly skewed if the skewness statistic was twice its standard error, and non-parametric statistical methods were applied.

Reliability

We evaluated the level of internal consistency among items within all multi-item BMMRS domains. We computed both raw and standardized alphas, but presented only the raw alphas in the Results since there was no more than a 0.023 absolute difference between them. We examined corrected item-to-total correlations and scale alpha-if-item-deleted to assess individual item performance within each scale. To assess temporal stability of responses, we analyzed test–retest data, calculating intraclass correlation coefficients (ICC) and their 95% confidence intervals for all domain and subscale scores (one-way random effects model). We assessed test-retest agreement on individual items, where applicable (e.g., Religious Preference, the Overall R/S Coping item, Self-Ranking of Religiosity, etc.), by computing ICC (Fleiss 1973) or Cohen's kappa (Cohen 1960) and their 95% CI, depending on the type of response distribution. To explore self-selection bias in the retest sample, we used χ^2 or *t*-tests to compare the demographic and religious/spiritual profiles of youth who completed the retest and those who did not.

Since a religious congregation is so integral to the questions in the R/S Support domain, we included only those reporting attendance at religious services at least once a month (referred to as "congregants") in the reliability analysis of this domain. We chose to use a more stringent definition of "congregant" in these analyses than the criteria we used in a prior study (someone who attends at least once a year) (Knight et al. 2007) because we were concerned that having respondents in the analysis sample who were not sufficiently involved in a congregation would potentially inflate reliability estimates due to their consistently responding "Not at all" to all the items. Therefore, the reliability coefficients reported in the current study differ from those previously published.

Construct Validity

We hypothesized that youth reporting not having a religion or being atheist should score lower on R/S measures compared to youth who named a particular religion, or who were not sure which religion ("don't know" or "confused"). We compared scores, or response percentages, for each BMMRS measure across these three "known" groups using one-way analysis of variance (ANOVA) for normally distributed domain and subscale scores, the Kruskall-Wallis test for highly skewed or ordinal data, and chi-square tests for dichotomous data. We also conducted these comparisons controlling for possible demographic confounders (gender, race/ethnicity, age group, parents' highest education level, and site). For multi-item domains that had lower internal consistency (alpha < 0.70), we compared group scores at the domain level and for each individual item in the domain.

For the Religious Support domain, we included all respondents in this known-groups analysis, not just "congregants," in order to have adequate cell sizes to carry out the group comparisons; e.g., there were only three respondents who met the definition of "congregant" and, at the same time, reported having no religion or being atheist. Inclusion of all respondents also allowed us to verify whether respondents who should be answering "None" or "Not at all" to the Religious Support items (i.e., those who were atheist or had no religion) were actually doing so.

Finally, we assessed the correlation between BMMRS measures and depressive symptoms as indicated by BDI-II scores. BDI-II scores were calculated when at least 17 of 21 items (80%) were answered. Since BDI-II scores were significantly right-skewed, their zero-order correlations with BMMRS measures were analyzed using the Spearman's rho. When examining Religious Support in these analyses, we included only "congregants" as they were most likely to give meaningful responses to the Religious Support items.

Results

Sample Demographics

Adolescent participants had a median age of 16 (IQR = 14–17). Two-thirds (67%) were female (typical for a clinical sample), 34% self-identified as black non-Hispanic, 40% Hispanic, 15% white non-Hispanic, 11% Asian or Other race, 55% reported receiving mostly A's/B's during their most recent grading period in school, and 39% had at least one parent who had completed college or beyond.

The 93 participants who returned for the retest were similar to those who did not with respect to gender, age, religious preference, and level of R/S. However, retest participants were less likely to be white non-Hispanic (11% vs. 17%), and more likely to report their race as Asian or Other (14% vs. 4%), compared to those not returning ($p = 0.037$).

Religious/Spiritual Characteristics

Most respondents (80%) reported a religious affiliation. Reflective of the local population, the most common religious affiliation responses were Catholic (34%), non-specific Christian (16%), and Protestant (various denominations) (13%). Eleven percent reported having no religion or being atheist, while 9% wrote in "don't know," "not sure," or "confused." The vast majority (89%) endorsed believing in a God that watches over them.

About half of respondents (52%) rated themselves as being not at all or only slightly religious or spiritual, while one in four (24%) reported being "moderately" or "very" religious *and* spiritual. The rest reported being either primarily *religious* (12%) or primarily *spiritual* (11%). The correlation between level of religiousness and spirituality was moderately high (Pearson's $r = 0.60$). The majority of respondents indicated a fair degree of commitment to their religious beliefs, with 57% agreeing or strongly agreeing that they try hard to carry their beliefs over into all dealings in life.

Most youth reported less than weekly attendance at religious services; 22% reported never attending services, while 46% reported infrequent attendance (once or twice a month or less). About one-third of respondents (32%) were frequent attendees of religious services (once a week or more often). More respondents, however, reported engaging in some form of private religious practice such as private prayer (85%), meditation (42%), reading

the Bible or other religious literature (65%), or saying grace before meals (72%). Descriptive statistics for BMMRS domains are presented in Table 1. For some BMMRS domains, our scoring directionality (the higher the score, the higher the level) is the reverse of what was done in other studies (e.g., DSES); therefore, we urge caution in comparing these means with those previously reported.

Reliability

Internal Consistency

The measures which showed adequate internal consistency among items within a domain or subscale (Cronbach's alpha $\geq$0.70), include DSES, Private Religious Practices, the positive R/S Coping items, Religious Support, Organizational Religiousness, Meaning, and Overall Self-Ranking (Table 1). The Forgiveness scale as a whole had a slightly lower alpha (.68) due to the item "I have forgiven others…" having a low corrected item-total correlation (CITC) of 0.39. The 5 negative items in the R/S Coping domain also had a lower alpha suggesting multidimensionality within this measure. A principal components analysis of these 5 items supported the presence of two factors, one consisting of the "anger at God," "God is punishing," and "God has abandoned" items (alpha = .53), and the other with the "question whether God exists" and "make sense of the situation without God" items (alpha = .40). However, the "make sense" item had loadings of $<$ .40 on both factors, indicating that this item fits poorly in this measure. R/S History and Commitment domains had low alphas, as expected, as these measures were not intended to be single-construct scales (George 1999; Williams 1999).

Test–retest

One-week response stability was moderate to high for most BMMRS domains, subscales, and individual items (Table 1). All domain-level scores except for the domains of Meaning and Belief had ICC $\geq$ 0.70. Using the original 4-point response scale for the Belief item, 73% of respondents gave the identical response at retest (kappa = .57). However, when the response categories were dichotomized into "strongly agree/agree" and "strongly disagree/disagree," the test-retest agreement rate became 92% and kappa 0.71, indicating that respondents were quite consistent when reporting whether they believed in God at all. Similarly, while the Commitment item of "I try hard to carry over my beliefs…" had a crude agreement rate of 60% (kappa = 0.44) with the same 4-point response scale, the agreement rate was 82% (kappa = .63) when responses were dichotomized into "agree" and "disagree." Test–retest stability was most problematic among the 5 negative R/S Coping items. The "make sense of the situation without God" item had the poorest agreement rate with only 45% of respondents giving consistent answers across time (ICC = 0.29); the other 4 items had crude agreement rates ranging from 60% to 72%.

Validity

Known-groups

Scores on most BMMRS measures were significantly higher among adolescents who reported a religious affiliation compared to those reporting "None/Atheist," even after

Table 1 Summary statistics and reliability coefficients (Cronbach's alpha and intraclass correlation coefficient [ICC] or Cohen's kappa) for each Brief Multidimensional Measure of Religiousness/Spirituality (BMMRS) domain among adolescent outpatients ages 12–18 (Total $N = 305$)

BMMRS domain	*N*	# of Items	Score range	Mean	*SD*	Alpha	Retest[e] ICC (95%CI)
Daily Spiritual Experience Scale	284	15	15–87	50.06	17.68	.93	.93 (.90, .96)
Belief	302	1	1–4	3.42	0.81	–	.57 (.43, .71)[f]
Forgiveness	295	3	3–12	9.14	2.12	.68	.81 (.72, .87)
Forgiven self	302	1	1–4	2.99	0.88	.56[d]	.71 (.60, .80)
Forgiven others	301	1	1–4	2.75	0.94	.73[d]	.63 (.49, .74)
Know that God forgives me	299	1	1–4	3.41	0.89	.46[d]	.67 (.55, .77)
Private Religious Practices	298	5	5–35	15.19	7.23	.76	.87 (.81, .91)
Religious/Spiritual Coping (Brief RCOPE)	294	11	11–39	24.43	5.69	.71	.80 (.71, .86)
Positive items	296	5	5–20	12.64	4.37	.88	.86 (.80, .91)
Negative items	295	5	5–20	9.29	2.85	.54	.58 (.42, .70)
God is punishing me	295	1	1–4	2.06	1.05	.55[d]	.58 (.43, .70)
Wonder whether God has abandoned me	301	1	1–4	1.51	0.80	.45[d]	.46 (.28, .60)
Make sense... without relying on God	302	1	1–4	2.21	1.07	.54[d]	.29 (.09, .46)
Question whether God exists	295	1	1–4	1.84	0.99	.45[d]	.55 (.39, .68)
Express anger at God	296	1	1–4	1.57	1.34	.39[d]	.60 (.45, .72)
Overall Coping item	299	1	1–4	2.55	1.02	–	.63 (.49, .74)
Religious Support[a]	162	12	12–48	30.29	8.98	.92	.95 (.91, .97)
Anticipated Support	161	3	3–12	9.45	2.85	.91	.89 (.83, .93)
Emotional Support from Others	161	3	3–12	8.17	2.99	.90	.90 (.85, .94)
Emotional Support Given to Others	160	3	3–12	7.79	2.86	.88	.87 (.80, .92)
Negative Interaction	159	3	3–12	4.85	1.87	.71	.70 (.56, .81)
Religious/Spiritual History	295	3	0–3	0.95	0.92	.45	.86 (.80, .91)
Life-changing experience[b]	300	1	0–1	31.33	26.19–36.96	–	.67 (.49, .85)[f]
Age of occurrence	98	1	4–18	12.41	3.11	–	.87 (.68, .95)

Table 1 continued

BMMRS domain	*N*	# of Items	Score range	Mean	*SD*	Alpha	Retest[e] ICC (95%CI)
Significant gain in faith[b]	297	1	0–1	37.71	32.23–43.52	–	.78 (.64, .93)[f]
Age of occurrence	108	1	4–18	12.57	2.96	–	.73 (.43, .89)
Significant loss in faith[b]	297	1	0–1	25.25	20.49–30.66	–	.78 (.63, .94)[f]
Age of occurrence	70	1	6–18	13.46	2.48	–	.95 (.85, .98)
Commitment	240	2	1–7	3.55	1.76	.59	.73 (.62, .81)
Try hard to carry over religious beliefs into all other dealings with life	299	1	1–4	2.55	0.97	–	.44 (.29, .58)[f]
Weekly hours (categorized) spent on activities for religious/spiritual reasons[c]	242	1	0–3	1	0–2	–	.64 (.52, .77)[f]
Organizational Religiousness	296	2	2–12	5.53	2.97	.73	.90 (.85, .93)
Religious service attendance	299	1	1–6	3.16	1.70	–	.86 (.80, .91)
Frequency of other activities at place of worship	298	1	1–6	2.40	1.65	–	.80 (.72, .87)
Religious Preference	264	1	–	–	–	–	.93 (.87, 1.00)[f]
Meaning	286	2	2–8	5.12	1.61	.72	.67 (.54, .77)
Overall Self-Ranking	300	2	2–8	4.45	1.52	.75	.78 (.69, .85)
Religious	301	1	1–4	2.79	0.83	–	.75 (.65, .83)
Spiritual	300	1	1–4	2.77	0.88	–	.79 (.70, .86)

[a] Among youth who reported attending religious services ≥ once/month ($n = 164$)

[b] For these dichotomous variables, we present the proportions answering "yes" and their 95% confidence intervals

[c] Due to a highly skewed distribution of responses, the median and interquartile range are presented

[d] Alpha if item deleted

[e] Retest sample $n = 93$

[f] Cohen's kappa statistics are presented instead of ICC due to dichotomous or non-ordinal response formats

controlling for demographic variables, showing that these measures can appropriately discriminate groups that are expected to differ (Table 2). Scores for the "Don't know/Confused" group were generally in between the other two groups, as expected, since this group did not reject religion outright as the "None/Atheist" group had, but at the same time, did not evince as strong an affiliation as those naming a religion.

The difference across groups for the Forgiveness domain score was primarily due to the "I know that God forgives me" item, which is the only item of the three that explicitly involves God and would therefore likely differentiate those who believe in God from those who do not. Among the 5 negative R/S Coping items, only two showed significant differences across the religious preference groups, with the religiously affiliated group having significantly higher scores on "God is punishing," and lower on "Question whether God exists." All three groups scored uniformly low on the "Wonder if God has abandoned" and "Express anger at God" items, suggesting that these items may generate too little variance to be useful among adolescents. While responses were more variable for the "Make sense…without relying on God" item, they did not differ across the three groups. The Negative Interaction subscale in the R/S Support domain also did not differentiate the religious preference groups due to the scores being uniformly low across all three groups.

Correlation with Depressive Symptoms

Several BMMRS measures were significantly correlated ($p < 0.05$) with BDI-II scores (Table 3). Higher scores on Forgiveness, Anticipated Support from one's congregation, and the Commitment item about carrying over religious beliefs into all other dealings in life were all associated with lower BDI-II scores, while all the BMMRS measures assessing negative R/S experiences (Negative Coping, Negative Interactions with others in congregation, and Loss in Faith) were positively correlated with BDI-II scores. In addition, youth who reported "None/Atheist" for Religious Preference had higher BDI-II scores (mean $\pm$ SD, 10.0 ± 8.6) than youth who named a religion (7.0 ± 6.4) or were unsure (6.1 ± 5.3) ($p < 0.05$).

Discussion

This study adds to the small but growing body of work utilizing the BMMRS among adolescents. Our study evaluated the psychometric properties of the BMMRS among adolescents more extensively than in previous studies, and our findings suggest that most of its brief measures are reliable and valid for use among adolescents. Most multi-item BMMRS domains and subscales appear to have adequate internal consistency (Cronbach's alpha $\geq .70$), particularly those measures intended to represent a unidimensional construct, such as Daily Spiritual Experiences, Private Religious Practices, Organizational Religiousness, and Meaning. These findings extend those of Pearce and colleagues (2003a, b), whose studies may be the first to report use of some of the BMMRS measures specifically among adolescents. Pearce and colleagues also reported alphas above .70 for Daily Spiritual Experiences, Organizational Religiousness, Private Religious Practices, and for the Anticipated Support and Negative Interactions subscales of Religious Support.

Some BMMRS measures were not expected to have high internal consistency as they were thought to be multidimensional, and for the sake of brevity, only a single item was included to assess each dimension. Williams (1999) notes that most researchers believe

Table 2 Comparison of BMMRS domain means, medians, proportions (95% confidence intervals or interquartile ranges) across religious preference groups

BMMRS domain	Religious Preference			Test statistic
	None/Atheist ($n = 30$)	Don't Know/ Confused ($n = 23$)	Named a religion ($n = 211$)	
Daily Spiritual Experience Scale	32.9 (26.6–39.1)	43.7 (36.6–50.8)	52.8 (50.5–55.1)	$F = 18.08$***
Believe in a God that watches over me[a]	3.0 (1.0–4.0)	3.0 (3.0–4.0)	4.0 (3.0–4.0)	$\chi^2 = 23.03$***
Forgiveness[a]	9.0 (6.0–10.0)	9.0 (7.0–10.0)	10.0 (9.0–11.0)	$\chi^2 = 8.64$*
Forgiven self[a]	3.0 (2.0–4.0)	3.0 (2.0–3.0)	3.0 (3.0–4.0)	$\chi^2 = 3.07$
Forgiven others[a]	3.0 (1.8–3.0)	3.0 (2.0–3.0)	3.0 (2.0–3.0)	$\chi^2 = 3.19$
Know that God forgives me[a]	3.0 (1.0–4.0)	4.0 (2.5–4.0)	4.0 (3.0–4.0)	$\chi^2 = 10.03$**
Private Religious Practices[a]	9.0 (5.0–13.0)	13.5 (8.0–17.0)	15.0 (10.0–21.0)	$\chi^2 = 18.39$***
Religious/Spiritual Coping	19.4 (16.9–21.9)	23.6 (20.8–26.4)	25.0 (24.5–25.7)	$F = 13.72$***
Positive subscale	8.4 (7.0–9.9)	11.4 (9.4–13.4)	13.3 (12.8–13.9)	$F = 19.17$***
Negative subscale[a]	9.0 (7.0–11.0)	9.0 (8.0–12.0)	9.0 (7.0–11.0)	$\chi^2 = 1.69$
God is punishing me[a]	1.0 (1.0–2.0)	1.5 (1.0–3.0)	2.0 (1.0–3.0)	$\chi^2 = 8.04$*
Wonder whether God has abandoned me[a]	1.0 (1.0–2.0)	1.0 (1.0–2.0)	1.0 (1.0–2.0)	$\chi^2 = 0.34$
Make sense … without relying on God[a]	2.0 (1.0–4.0)	2.0 (1.0–3.5)	2.0 (1.0–3.0)	$\chi^2 = 1.64$
Question whether God exists[a]	2.0 (1.0–3.0)	2.0 (1.0–4.0)	1.0 (1.0–2.0)	$\chi^2 = 10.23$**
Express anger at God[a]	1.0 (1.0–2.0)	1.0 (1.0–2.0)	1.0 (1.0–2.0)	$\chi^2 = 0.67$
Overall Coping item	1.7 (1.3–2.1)	2.3 (1.9–2.8)	2.7 (2.6–2.9)	$F = 16.12$***
Religious Support	20.3 (16.2–24.4)	25.9 (21.2–30.7)	27.0 (25.6–28.5)	$F = 5.24$**
Anticipated Support	5.4 (4.2–6.7)	8.0 (6.3–9.6)	8.4 (8.0–8.9)	$F = 8.99$***
Emotional Support From Others	5.4 (4.1–6.6)	6.9 (5.3–8.5)	7.1 (6.7–7.6)	$F = 3.40$*
Emotional Support Given to Others	5.2 (4.0–6.4)	6.3 (4.8–7.8)	6.8 (6.4–7.2)	$F = 3.42$*
Negative Interaction[a]	3.0 (3.0–4.0)	4.0 (3.0–5.0)	4.0 (3.0–6.0)	$\chi^2 = 2.99$
Religious/Spiritual History	–	–	–	–
Life-changing experience[b]	6.9 (1.7–23.9)	36.4 (19.3–57.8)	36.7 (30.4–43.4)	$\chi^2 = 10.26$**
Significant gain in faith[b]	6.7 (1.7–23.2)	23.8 (10.2–46.2)	45.5 (38.8–52.3)	$\chi^2 = 18.84$***
Significant loss in faith[b]	24.1 (11.9–42.8)	25.0 (10.8–48.0)	27.6 (22.0–34.1)	$\chi^2 = 0.20$
Commitment	1.7 (1.3.–2.0)	2.7 (1.9–3.4)	3.9 (3.7–4.2)	$F = 22.87$***
Try hard to carry over religious beliefs into all other dealings with life	1.7 (1.4–2.0)	2.2 (1.8–2.6)	2.8 (2.6–2.9)	$F = 21.53$***
Weekly hours (categorized) spent on church or other activities for religious/ spiritual reasons[a]	0.0 (0.0–0.0)	0.0 (0.0–2.0)	1.0 (0.0–2.0)	$\chi^2 = 22.64$***
Organizational Religiousness	3.3 (2.6–4.0)	4.2 (3.1–5.4)	6.2 (5.8–6.6)	$F = 16.38$***
Religious service attendance	1.7 (1.3–2.2)	2.3 (1.6–2.9)	3.6 (3.4–3.8)	$F = 21.77$***
Frequency of other activities at place of worship[a]	1.0 (1.0–2.0)	1.0 (1.0–3.0)	2.0 (1.0–4.0)	$\chi^2 = 11.51$**
Meaning	4.4 (3.7–5.1)	4.7 (3.9–5.4)	5.3 (5.1–5.5)	$F = 4.67$**

Table 2 continued

BMMRS domain	Religious Preference			Test statistic
	None/Atheist ($n = 30$)	Don't Know/ Confused ($n = 23$)	Named a religion ($n = 211$)	
Overall Self-Ranking	3.2 (2.7–3.7)	4.0 (3.5–4.5)	4.7 (4.5–4.9)	$F = 15.88$***
Religious	1.4 (1.1–1.7)	1.9 (1.6–2.2)	2.4 (2.3–2.5)	$F = 24.43$***
Spiritual	1.8 (1.5–2.1)	2.1 (1.7–2.5)	2.3 (2.2–2.4)	$F = 5.16$**

[a] Due to highly skewed distributions, medians, interquartile ranges, and the results of Kruskall-Wallis H test comparing groups are presented

[b] Percentages, their 95% confidence intervals, and the results of χ^2 tests of association, are presented for these variables

* $p < 0.05$, ** $p \leq 0.01$, *** $p \leq 0.001$

that the Commitment items are best thought of as comprising individual dimensions rather than a single scale. Within this domain, the item on the average household monthly contribution to a congregation or religious causes is likely not a useful item for adolescents as they may not be the most knowledgeable reporters for this information. Half of our sample did not answer this question.

The Forgiveness and Negative R/S Coping measures also appear to be internally heterogeneous among adolescents. Our results suggest that the item on forgiving others may operate quite differently from the other two Forgiveness items, particularly the item on forgiveness by God. Similarly, the Negative R/S Coping items appear to consist of at least two factors, and the Self-Directed Coping item ("Make sense of situation without relying on God") failed to load adequately on any factor, perhaps due to the relatively high frequency of use of this type of coping by adolescents in our sample. In their analysis of adult data, Idler et al. (2003) reported Cronbach's alphas for these two domains that were very similar to the ones we report for adolescents (Forgiveness: .66 adults vs. .68 adolescents; and Negative R/S Coping: .54 vs. .54, respectively). Future studies should analyze the items within Forgiveness and Negative R/S Coping separately, rather than solely as overall summary scores, to avoid obscuring potentially differing effects among these items. In addition, to see whether psychometric performance could be improved, we recommend utilizing longer forms of these measures and, as suggested by Gorsuch and Walker (2006) and Mahoney et al. (2006), evaluating these constructs not just globally (i.e., "trait" assessment), but relative to a variety of specific stressors or offenses (i.e., "state" assessment). This may be particularly important for the Negative R/S Coping measure which had poor test–retest reliability.

This study provides initial evidence of construct validity of the BMMRS among adolescents. In a test of known-groups validity, most BMMRS measures were able to accurately differentiate youth who were expected to differ based on their self-reported religious preference. Those youth who reported having a religion had significantly higher scores on most BMMRS measures compared to those reporting "No religion/Atheist," and youth who were "confused" or less certain about their religious preference tended to have scores in between. Not surprisingly, the one item on which the religiously affiliated group scored lower compared to the other groups was the Negative Coping item, "I question whether God exists." These findings suggest that youth can be internally consistent responders across BMMRS domains.

Table 3 Correlations between each BMMRS measure and Beck Depression Inventory (BDI-II) scores among adolescent outpatients ages 12–18

Domain	Spearman's rho	*p*-value (two-tailed)	Analysis *N*
Daily Spiritual Experience Scale	−0.019	–	278
Beliefs	−0.045	–	289
Forgiveness	−0.181	.002	286
Forgiven self	−0.178	.002	291
Forgiven others	−0.098	–	289
Know that God forgives me	−0.123	.037	289
Private Religious Practices	−0.037	–	290
Religious/Spiritual Coping			
Positive items	−0.009	–	289
Negative items	0.295	<.001	289
God is punishing me	0.157	.008	288
Wonder whether God has abandoned	0.370	<.001	290
Make sense without relying on God	0.065	–	291
Question whether God exists	0.161	.006	289
Express anger at God	0.211	<.001	288
Overall Coping item	0.011	–	289
Religious Support[a]			
Emotional Support from Others	−0.100	–	159
Emotional Support Given to Others	−0.093	–	159
Negative Interaction	0.167	.035	159
Anticipated Support	−0.196	.013	159
Religious/Spiritual History			
Life-changing experience	−0.014	–	290
Significant gain in faith	0.020	–	288
Significant loss in faith	0.172	.003	288
Commitment			
Try hard to carry over religious beliefs into all other dealings with life	−0.119	.043	289
Weekly hours spent on church or other activities for religious/spiritual reasons§	−0.073	–	235
Organizational Religiousness	−0.013	–	286
Meaning	−0.001	–	278
Overall Self-Ranking	−0.104	–	291
Religious	−0.093	–	291
Spiritual	−0.109	–	291

[a] Among youth who reported participating in religious services at least monthly

Construct validity was also supported by the association between several BMMRS measures and adolescent depressive symptoms. As anticipated, there were moderate but significant positive correlations between BDI-II scores and those BMMRS measures addressing negative R/S experiences. These include the Negative Coping (except for Self-

Directed Religious Coping) and Loss in Faith items, which Pargament et al. and others (Fitchett et al. 2004; Hill and Pargament 2003; Pargament 2002; Pargament et al. 2001) have referred to as indicators of "religious/spiritual struggle." The increased risk for depressive symptoms among those with higher levels of R/S struggle has been shown in a number of adult studies (Koenig et al. 2001); the current study indicates that this relationship may exist in adolescents as well.

Higher scores on the Negative Interaction subscale of Religious Support were also positively correlated with BDI-II scores, while the Anticipated Support subscale had a negative correlation. Using a different depressive symptoms measure, Pearce et al. (2003b) reported similar findings for these two Religious Support subscales in a school-based, largely White sample of 744 7th–9th graders, also from the Northeast, and the effects persisted even after controlling for demographic characteristics and level of religiosity. The similar findings in these studies give support for the psychometric stability of the Religious Support measures across different groups of adolescents (school-based vs. clinic, largely White vs. minority, younger vs. older).

The other BMMRS measures that had negative correlations with adolescent depressive symptoms were Forgiveness and the Commitment item on carrying over religious beliefs into all other dealings in life. While very few studies to date have examined the relationship between forgiveness and health outcomes in adolescents, two recent studies showed inverse associations between religiously motivated forgiveness and adolescent substance use (Knight et al. 2007; Walker et al. 2007). However, the strength of the association varied across the different dimensions of forgiveness in these studies, as in the current study, reinforcing the need to examine these dimensions separately in future studies.

The Commitment item in the BMMRS could be considered conceptually similar to the "importance of religion" items widely used in previous studies of religiousness among adolescents (Cotton et al. 2006; Rew and Wong 2006; Smith and Denton 2005; Wong et al. 2006). However, the BMMRS item may be more useful in adolescent health research than a global religious importance item because it is derived from a measure of intrinsic religious motivation (Hoge 1972; Williams 1999), i.e., the degree to which one's religion actually shapes one's thoughts and actions in daily life. In fact, previous adolescent studies utilizing an "importance of religion" item have yielded mixed results regarding its significance (Cotton et al. 2005; Wong et al. 2006). In the current study, the Commitment item had a stronger association with depressive symptoms than other religiosity measures such as Organizational Religiousness and self-rated level of overall religiousness. More work is needed to improve the retest reliability of this Commitment item. Studies should examine the original 10-item scale developed by Hoge (1972), from which the BMMRS item was drawn, to identify those items that are most reliable and valid for use among adolescents.

The lack of associations between depressive symptoms and other BMMRS measures such as the DSES and Positive R/S Coping measures contrasts with the results of numerous adult studies (Koenig et al. 1992, 2001; McCullough and Larson 1999; Underwood and Teresi 2002) and some adolescent studies (Cotton et al. 2005; Koenig et al. 2001; Nonnemaker et al. 2003; Schapman and Inderbitzen-Nolan 2002; Wong et al. 2006). More detailed work is needed in this area, such as parsing out the relationships of the BMMRS measures with different aspects of adolescent depression (cognitive vs. somatic) and exploring possible non-linear patterns of relationship.

Strengths of this study include its racially and ethnically diverse sample, and its uniqueness as one of only a few studies to date to extensively examine the reliability and

validity of brief R/S measures in adolescents. This study also has several limitations. The study sample consisted only of adolescents drawn from large, urban clinic populations in one city in the Northeast, who are mainly affiliated with Christ-based religions, and findings may not be generalizable to youth in other parts of the country, from non-urban communities, and who practice other types of faiths and religions. Also, there may be self-selection bias in our overall sample, as well as in the sample that returned for the retest. Youth who chose to participate may have done so because of a greater interest in, or relevance of, the topic, than those who chose not to participate. However, if this were the case, we would likely have seen higher scores on indicators of religious involvement compared to a national sample (Smith and Denton 2005). Instead, our sample had a lower rate (32%) for one indicator, weekly religious service attendance, than a national sample (40%). Finally, this study was unable to explicitly examine reliability/validity of BMMRS within specific subgroups of youth (e.g., younger adolescents [only 46 in our sample were 13 or under], specific religious denominations, race/ethnicity groups, etc.), or to show how sensitive the BMMRS measures are to change over time.

This study provides a broadened look at the religious and spiritual lives of adolescents while demonstrating the usefulness of the BMMRS for adolescent health research. As shown in this and previous studies (Smith and Denton 2005), religion and spirituality are important and relevant factors in the lives of today's adolescents, and work has only just begun to enhance our understanding of the specific mechanisms through which R/S impacts adolescent health and behavior. To that end, the BMMRS shows promise as a reliable and valid tool for adolescent health research, offering researchers brief, more specific measures of a range of R/S domains, and expanding the range of domains able to be studied beyond what has been the focus to date.

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