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The Role of Religiousness/Spirituality in Health-Related Quality of Life Among Adolescents with HIV: A Latent Profile Analysis

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Abstract

The purpose of this study was to determine whether distinct latent profiles of religiousness/spirituality exist for ALWH, and if so, are latent profile memberships associated with health-related quality of life (HRQoL). Latent profile analysis of religiosity identified four profiles/groups. Compared to the other three groups, higher levels of emotional well-being were found among young perinatally infected adolescents who attended religious services, but who did not pray privately, feel God's presence or identify as religious or spiritual. Social HRQoL was significantly higher among the highest overall religious/spiritual group. Understanding adolescent profiles of religiousness/spirituality on HRQoL could inform faith-based interventions.

Keywords

Adolescence; HIV; Religion; Spirituality; Palliative care; Health-related quality of life

Introduction

Examining the impact of religiousness and spirituality on health-related quality of life (HRQoL) could inform faith-based interventions intended to support an integrative message involving the whole of life, especially for adolescents living with HIV (ALWH). There is a distinction between religiousness and spirituality (Hill and Pargament 2003). Both are concerned with the sacred and non-material aspects of life. As defined by the 2009 Spiritual

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Compliance with Ethical Standards: Ethical Approval All procedures performed in this study involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

Care Consensus Conference (Pulchalski et al. 2009), spirituality is concerned with the transcendent, addressing ultimate questions about life's meaning and purpose. Religion is a spirituality that is shared by a group of people, often with a common set of beliefs and practices. Individuals who consider themselves highly religious are quite likely to also consider themselves spiritual, while those who consider themselves spiritual are somewhat more likely to not identify as religious (Astin et al. 2005; Walker et al. 2007). This differentiation may have predictive value regarding health outcomes.

Religious practices and spirituality are important to ALWH. ALWH are more likely to want their treating physician to pray with them than HIV-negative adolescents (Bernstein et al. 2009); and “being at peace spiritually, if dying,” was important for 100 % of surveyed ALWH (Lyon et al. 2010). Spirituality is associated with decreased depression and anxiety among ALWH (Lyon et al. 2014a, b). Yet, some types of religious belief and experience may undermine health and well-being. Adolescents who persist in the belief “HIV is a punishment from God” are significantly less adherent to antiretroviral medication regimens than adolescents who never believed HIV was a punishment from God (Lyon et al. 2014a, b).

Among HIV positive adults, higher levels of spirituality and positive religious coping are associated with overall well-being and slowed disease progression (Pargament et al. 2004a, b; Tuck et al. 2001; Cotton et al. 2006; Ironson et al. 2006; Yi et al. 2006). Spiritually based interventions have demonstrated efficacy in overcoming the stigma and shame of HIV (Tarakeshwar et al. 2005; Margolin et al. 2007). Among adults, negative religious coping, such as the belief that HIV is a punishment from God, predicts decline in health status (Pargament et al. 2004a, b).

To date, studies of religiousness/spirituality often use the traditional variable-centered analytical approaches to examine the relationship of religiousness/spirituality with HRQoL. In the present study, we applied latent profile analysis (LPA) (Clogg 1995; Collins and Lanza 2010; McCutcheon 1987; Muthén 2002) that is a person-centered approach to assess latent classes/groups that are a priori unknown in the population under study with respect to religiousness/spirituality. Religiousness/spirituality was operationally defined using five pre-selected items based on previous research with ALWH (Lyon et al. 2014a, b) from the Brief Multidimensional Measurement of Religiousness/Spirituality (BMMRS) questionnaire. This study asked two questions: (1) Do different profiles or groups of religiousness/spirituality exist for adolescents living with HIV? and (2) If profiles of religiousness/spirituality exist, is the profile membership associated with HRQoL?

Method

Participants

The parent study is a 2-arm single-blinded, controlled, randomized clinical trial (Dallas et al. 2012). We enrolled and randomized 105 ALWH from July 27, 2010, through June 30, 2014. ALWH were enrolled from six pediatric hospital-based HIV clinics in the southern and mid-Atlantic regions of the USA. The data presented are from the baseline assessments, administered prior to randomization.

Eligible subjects were English speaking, at least 14 up to 21 years of age, and knew their HIV diagnosis. Exclusion criteria were in foster care, significantly depressed, actively suicidal, homicidal or psychotic, or failed screening for HIV dementia. Participants provided written informed consent or, if under the age of 18, legal guardian consent and assent before participation. This study was approved by all six study sites' institutional review boards.

Setting and Procedures

At the baseline visit, prior to randomization, adolescents completed study questionnaires face-to-face in a private room with a trained research assistant (RA) who asked each question out loud and recorded the responses onto a Teleform® during the administration. Only the RA was present during the assessment with the adolescent.

Measures

The Brief Multidimensional Measurement of Religiousness/Spirituality (BMMRS-adapted) (Cotton et al. 2010; Fetzer Institute 1999; Harris et al. 2007; Masters et al. 2009; Szaflarski et al. 2012) is a 36 item survey developed to assess health-relevant domains of religiousness and spirituality for use in clinical research. Items were selected by the Fetzer Institute and the National Institute on Aging Working Group (Fetzer Institute 1999) to be most strongly predictive of health outcomes and to standardize common religious/spiritual items. No total score is calculated. Investigators pre-select items, domains, or factors for analysis. Factor analytic methods assume homogeneity of the study population, while latent class analysis makes no assumptions about homogeneity. Reliability and validity are well established with adolescent and young adult populations (Cotton et al. 2010; Harris et al. 2007; Masters et al. 2009). Five items were selected prior to the analysis, based on our previous research indicating that only five were statistically significantly correlated with outcomes of interest (Lyon et al. 2014a, b). From the BMMRS, these same five items were drawn from the subscales daily spiritual experiences (I feel God's presence from 0 = Never to 5 = More than once a week); private religious practices (How often do you pray privately...at times when you are not attending functions of a religiously based group? From 0 = Never to 7 = More than once a day); organizational religiousness (How often do you go to religious services? From 0 = Never to 5 = Many times a day). Religious identity (To what extent do you consider yourself a religious person? From 0 = Not at all religious to 3 = Very Religious). Spiritual identity (To what extent do you consider yourself a spiritual person? From 0 = Not at all spiritual to 3 = Very Spiritual). Religiousness/spirituality was operationally defined as higher scores on each these five items representing greater religiousness/spirituality with four items reflecting religiousness and one item reflecting spirituality.

The Pediatric Quality of Life Inventory 4.0 (Varni et al. 2003) is a 23-item instrument measuring HRQoL domains of functional quality of life (physical, emotional, social, and school) applicable to pediatric populations with acute and chronic health conditions. Internal reliability is $\alpha = .88$ for Total Scale Score. Validity using the known-groups method and factor analysis indicates correlations between morbidity and illness burden. There is a five-point Likert scale ranging from never to almost always. Higher scores indicate better HRQoL.

Data Analysis Plan

Descriptive statistics summarized demographic and clinical characteristics. The primary goal of this latent profile analysis (LPA) (Clogg 1995; Collins and Lanza 2010; McCutcheon 1987; Muthén 2002) was to identify latent profiles of religiousness/spirituality. The second goal was to assess the relationship of the latent profile membership with HRQoL.

We fit a series of LPA models with increasing number of latent profiles and determined the optimal number of latent profiles by comparing K-profile model with (K-1)-profile model iteratively. We used Bayesian information criterion (BIC), Akaike information criterion (AIC), Lo–Mendell–Rubin likelihood ratio (LMR LR), the adjusted LMR LR (ALMR LR) test, and the bootstrap likelihood ratio test (BLRT) for model comparisons. Once the number of latent profiles was identified, we classified individuals into their most likely latent profiles on the basis of the estimated posterior probabilities for the observations. We assessed the quality of profile membership classification via average posterior probabilities and the entropy statistic. Next, we classified individuals into appropriate latent profiles based on their largest posterior probabilities. We assessed the prevalence rates of the latent profiles and the mean scores of the religiousness/spirituality belief measures in each latent profile. We defined the profiles based on the mean scores of the religiousness/spirituality measures in each profile.

Finally, we examined the relationships of the latent profile membership with HRQoL. To take into account the possible measurement error, we applied the 3-step approach (Vermunt 2010; Asparouhov and Muthén 2012) to analyze the relationships of the latent profile membership with the HRQoL (Asparouhov and Muthén 2012; Muthén and Muthén 1998–2012). For each of the four HRQoL measures, we conducted an overall test of the mean scores across the latent profiles, as well as pairwise comparisons of the mean scores between different latent profiles, using *Mplus* 7.3.

Results

One hundred five adolescents completed baseline assessments. Participants were mean age 17.8 (range 14 up to 21 years); 53 % male, 74 % perinatally acquired HIV; 93 % African-American or Black; and 7 % Hispanic or Latino. Family income was equal or below the federal poverty line for 52 % of participants; 101–200 % of the federal poverty line for 15 %; 201–300 % of the federal poverty line for 8 %; >300 % of the federal poverty line for 18 % of the sample. Twelve percent did not know their family income. Living arrangement was 88 % in own house or apartment; 10 % in someone else's house or apartment; 1 % in a shelter; and 1 % other. Legal guardian/family member educational attainment was 22 % no high school or GED, 40 % high school or GED, 31 % some college, 4 % bachelor's degree, 2 % master's degree, and 1 % doctorate. Adolescents' self-reported sexual orientation was non-heterosexual for 30 %. Twenty-one percent reported that both of their parents had died.

Religious affiliation was 85 % Christianity, 4 % Islamic, and 11 % none. Table 1 shows the means and standard deviations of the religiousness/spirituality measures.

Model fit indices/statistics for different LPA models are shown in Table 2. The results provide evidence that the target population is not homogeneous with respect to religiousness/spirituality, but heterogeneous because (1) the single-profile model has the largest information criterion indices, and (2) the *P* values of all the statistical tests in the 2-profile model are <0.05 , indicating that the single-profile model was rejected and a model with at least 2 latent profiles is in favor. The 4-profile model fits data better than the 2- or 3-profile model because (1) its information criterion indices are smaller, and (2) the LMR LR, ALMR LR, and BLRT tests are all statistically significant. In comparison with the 4-profile and 5-profile models, though the latter has smaller AIC and ABIC, the former has a smaller BIC, which is considered a better model fit index (Nylund et al. 2007). In addition, two of the three statistical tests (i.e., LMR LR and ALMR LR, and BLRT) cannot reject the 4-profile model. Thus, we favor the 4-profile model.

The profile prevalence rates are shown in Column 1 of Table 3. About 24.2 % ($N = 25$) of the patients were assigned into Profile 1, and the corresponding figures are 10.6 % ($N = 11$), 46.4 % ($N = 48$), and 18.9 % ($N = 20$), respectively, for Profiles 2, 3, and 4. The diagonal figures in Table 3 are estimated average individual posterior probabilities for being correctly assigned to latent Profiles 1, 2, 3, and 4, respectively, that are much higher than the cutoff point of 0.70 (Nagin 2005). In addition, the entropy statistic is also large, 0.93. All the results show an adequate quality of latent profile classification in the 4-profile model.

The estimated mean values of the religiousness/spirituality measures are distinctive between the latent profiles and show clear patterns of religiousness/spirituality across the profiles (see Fig. 1). Profile 3 has the highest scores in all the religiousness/spirituality measures: The mean scores of the five religiousness/spirituality measures are 3.84, 5.44, 3.35, 2.00, and 1.77, respectively. In contrast, adolescent patients in Profile 4 had smallest scores in all religiousness/spirituality measures on average: The mean scores of the five religiousness/spirituality measures are 0.50, 0.61, 0.55, 0.26, and 0.33, respectively. The mean religiousness/spirituality scores in Profile 1 are high for private prayer (5.14), but moderate for God's presence (2.83), and low for attending service (0.75), religious person (1.05), and spiritual person (1.45). The mean religiousness/spirituality scores in Profile 2 are high for attending service (3.94), but low for other measures: 1.13 for private prayer, 0.59 for God's presence; 1.12 for religious person; and 0.99 for spiritual person. Upon the patterns of religiousness/spirituality measures, we define the four latent profiles as: highest overall religiousness/spirituality (Profile 3), attending religious services only (Profile 2), religious experiences without attending services (Profile 1), and lowest overall religiousness/spirituality (Profile 4).

As illustrated in Fig. 1, Profile 3, 46.4 % of the sample, reported attending religious services every week or more often, praying privately once a day, feeling God's presence most days, and identifying themselves as slightly to moderately religious and spiritual.

Profile 2, 10.6 % of the sample, reported attending religious services every week or more often, praying privately less than once a month, felt God's presence once in a while, and identified as slightly religious and spiritual.

Profile 1, 24.2 % of the sample, attended religious services once or twice a year, prayed privately once a day, feeling God's presence most days, and identifying themselves as slightly religious or spiritual.

Profile 4, 18.9 % of the sample, rarely attended religious services, rarely prayed, rarely experienced God's presence and did not think of themselves as religious or spiritual.

Examining the profile by demographics, Profile 2 (mean age = 16) and Profile 4 (mean age = 16.9) were significantly younger, than Profile 1 (mean age = 18.2) and Profile 3 (mean age = 18.2) adolescents. Perinatally infected adolescents were significantly more likely to be in Profile 2 (99 %, $P = 0.048$) and Profile 4 (99 %, $P = 0.031$) than in Profile 1 (64 %, $P = 0.096$) or Profile 3 (62 %, $P = 0.072$). Self-reported African-American race, Latino/Hispanic ethnicity, and non-heterosexuality were not correlated with the latent profiles.

The relationships of latent profile membership with HRQoL measures are shown in Table 4. Emotional functioning scores significantly vary across the four latent religiousness/spirituality profiles (the overall Chi-square statistic P value < 0.001). The mean scores of the emotional functioning were significantly different between Profiles 1 and 2 ($P < 0.001$), Profiles 2 and 3 ($P < 0.001$), and Profiles 2 and 4 ($P = 0.005$). However, the other three HRQoL measures (i.e., physical function, school function, and social function) did not significantly vary across the latent religiousness/spirituality profiles, except that Profile 1 and 3 were also significantly different in the mean score of social functioning ($P = 0.032$).

Discussion

This study is the first to explore religiousness/spirituality among ALWH using a *person-centered* analytic approach. Four distinct latent profiles/groups of adolescents were identified: highest overall religiousness/spirituality (Profile 3), religious service attendance only (Profile 2), religious experience without religious service attendance (Profile 1), and lowest overall religiousness/spirituality (Profile 4). These four profiles closely align with Marcia's (Marcia 1966; Schwartz 2001; Wong et al. 2006) theoretical constructs of adolescent identity formation: identity achievement, identity crisis/moratorium, foreclosure, and identity diffusion, which built upon the earlier work of Erikson (1956). Thus, identifying formation theory guided the interpretation of study findings.

The group comprising highest overall religiousness/spirituality, Profile 3, consisted of 46.4 % of ALWH. They were more likely to attend religious services, to frequently pray privately, to feel God's presence, and to think of themselves as religious and spiritual. This profile is consistent with Marcia's *Foreclosure* status, when commitments are made based on parental ideas and beliefs that are accepted without question. Future studies could examine family cohesion as an alternative explanation.

Another 24.2 % of ALWH, Profile 1, comprised the unaffiliated but believer group. Despite not attending religious services, they often prayed privately, experienced God's presence, and thought of themselves as somewhat religious/spiritual. This profile is consistent with Marcia's *Identity Achievement*, having developed an internal, as opposed to external, locus of self-definition (Marcia 1966; Schwartz 2001).

Lowest overall religiousness/spirituality, Profile 4, comprised 18.9 % of ALWH. They did not attending religious services, pray privately, feel God's presence, or consider themselves as religious or spiritual persons. This profile is consistent with Marcia's *Identity Diffusion* where adolescents may avoid exploring or making commitments. Future research could examine whether or not these adolescents question everything, or are doubters (Hunsberger et al. 2002; Krause and Wulff 2004).

Profile 2, at 10.6 %, religious services attendance only, attended religious services, but seldom prayed privately, rarely felt God's presence, and thought of themselves as not religious/spiritual. This profile is consistent with Marcia's *Moratorium or Identity Crisis*. Commitments are either absent or only vaguely defined (Marcia 1966; Schwartz 2001). They may be simply complying with parental expectations to attend religious services.

Social HRQoL was significantly higher among the highest overall religiousness/spirituality (foreclosed identity) than those in the subgroup religious experience without church attendance. Attendance at religious services appears to provide social support for those who hold traditional beliefs without conflict.

Better emotional HRQoL was found for ALWH with Religious Attendance only (identity crisis) and lowest overall religiousness/spirituality (identity diffusion). They were significantly younger than the other two latent profiles, and 99 % of the adolescents in these subgroups were perinatally infected. Future studies should examine what accounts for their better emotional health.

The finding that higher religiousness/spirituality correlated with poorer emotional HRQoL confirms associations between religiousness and depression in studies of religious doubt among high school students (Hunsberger et al. 2002; Krause and Wulff 2004). In contrast, a systematic review found 90 % of studies indicated a significant positive correlation between spirituality and mental health (Wong et al. 2006). Varying measures of constructs may account for these discrepancies, as well as differences in analytical methods.

Recent studies using latent profile analysis confirm our study findings. In a study of 3966 adolescents, emerging adults and older adults, also using the Brief MMRS, low spirituality was associated with low depression for adolescents (Barton and Miller 2015). Similarly, in a nationwide survey of young Canadians with regular church involvement, poorer levels of emotional well-being and physical health were found compared to those who did not participate in religious services (Michaelson et al. 2014). Qualitative follow-up suggests religious teachings were not supporting emotional and physical health (Michaelson et al. 2015). Also confirming study findings was a study of Israeli adolescents using the Brief MMRS and latent class analysis (Cobb et al. 2015) which also found the youngest cohort to be the lowest overall religiousness/spirituality group.

Limitations

Limitations of this study include a cross-sectional analysis, possible selection bias and information bias, confounding, and lack of generalizability beyond an urban population of primarily African-American and Hispanic/Latino ALWH residing in the South and mid-

Atlantic USA. Data for the study relied exclusively on self-report, collected in an outpatient hospital setting; therefore, scores may represent individual self-representational biases and potentially also may be affected by measuring religiousness/spirituality in a secular setting.

Conclusion

Latent profile analysis of religiousness/spirituality identified four profiles/groups among African-American and Latino ALWH. Compared to the other three groups, higher levels of emotional well-being were found among young perinatally infected adolescents who attended religious services, but who did not pray privately, feel God's presence, or identify as religious or spiritual. Social HRQoL was significantly higher among the highest overall religious/spiritual group. Understanding adolescent profiles of religiousness/spirituality on HRQoL could inform faith-based interventions.

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References

- Asparouhov T, Muthén B. Auxiliary variables in mixture modeling: A 3-step approach using Mplus. 2012 Mplus web notes: No. 15.
- Astin, AW.; Astin, HS.; Lindholm, JA.; Bryant, AN. The spiritual life of college students: A national study of students' search for meaning and purpose. Los Angeles, CA: Higher Education Research Institute, UCLA; 2005.
- Barton YA, Miller L. Spirituality and positive psychology go hand in hand: An investigation of multiple empirically derived profiles and related protective benefits. *Journal of Religion and Health*. 2015; 54:829–843. [PubMed: 25862339]
- Bernstein K, Lyon ME, D'Angelo LJ. Spirituality and religion in adolescents with and without HIV/AIDS. *Journal of Adolescent Health*. 2009; 44:S25.
- Clogg, CC. Latent class models. In: Arminger, G.; Clogg, CC.; Sobel, ME., editors. *Handbook of statistical modeling for the social and behavioral sciences*. New York: Plenum Press; 1995. p. 311-359.
- Cobb E, Kor A, Miller L. Support for adolescent spirituality: Contributions of religious practice and trait mindfulness. *Journal of Religion and Health*. 2015; 54:862–870. [PubMed: 25862340]
- Collins, LM.; Lanza, ST. Latent class and latent transition analysis: With applications in the social, behavioural, and health sciences. New York: Wiley; 2010.
- Cotton S, McGrady ME, Rosenthal SL. Measurement of religiosity/spirituality in adolescent health outcomes research: Trends and recommendations. *Journal of Religion and Health*. 2010; 49(4):414–444. [PubMed: 20127172]
- Cotton S, Puchalski CM, Sherman SN, et al. Spirituality and religion in patients with HIV/AIDS. *Journal of General Internal Medicine*. 2006; 21(Suppl 5):S5–S13. [PubMed: 17083501]
- Dallas RH, Wilkins ML, Wang J, Garcia A, Lyon ME. Longitudinal pediatric palliative care: Quality of life & spiritual struggle (FACE): Design and methods. *Contemporary Clinical Trials*. 2012; 33(5):1033–1043. [PubMed: 22664645]
- Erikson, Erik. The problem of ego identity. *Journal of the American Psychoanalytic Association*. 1956; 4:56–121. [PubMed: 13286157]

- Fetzer Institute. National Institute on Aging Working Group. Multidimensional measurement of religiousness, spirituality for use in health research A report of the national working group. MI: Fetzer Institute, 2003; 1999.
- Harris SS, Holder DW, Kulig J, Schrier LA, Knight JR. Reliability and validity of the brief multidimensional measure of religiousness/spirituality among adolescents. *Journal of Religion and Health*. 2007; 47:438–457. [PubMed: 19093673]
- Hill PC, Pargament KI. Advances in the conceptualization and measurement of religion and spirituality: Implications for physical and mental health research. *American Psychologist*. 2003; 58:64–74. [PubMed: 12674819]
- Hunsberger B, Pratt M, Pancer SM. A longitudinal study of religious doubts in high school and beyond: Relationships, stability and searching for answers. *Journal of the Scientific Study of Religion*. 2002; 41:255–266.
- Ironson G, Stuetzle R, Fletcher MA. An increase in religiousness/spirituality occurs after HIV diagnosis and predicts slower disease progression over 4 years in people with HIV. *Journal of General Internal Medicine*. 2006; 21(Suppl 5):S62–S68. [PubMed: 17083503]
- Krause N, Wulff KN. Religious doubt and health: Exploring the potential dark side of religion. *Sociology of Religion*. 2004; 65:35–56.
- Lyon ME, Cheng YI, Wang J. Association of end-of-life medical treatment preferences, spiritual beliefs and religion among HIV positive adolescents. Poster presented at caring for the human spirit: Driving the research agenda for spiritual care in healthcare; New York City, NY. 2014.
- Lyon ME, Garvie PA, Briggs L, He J, McCarter R, D'Angelo L. Do families know what adolescents want? An end-of-life (EOL) survey of adolescents with HIV/AIDS and their families. *Journal of Adolescent Health*. 2010; 46:S4–S5.
- Lyon ME, Garvie PA, He J, Malow R, McCarter R, D'Angelo L. Spiritual well-being among HIV-infected adolescents and their families. *Journal of Religion and Health*. 2014; 53(3):637–653. [PubMed: 23104266]
- Marcia JE. Development and validation of ego identity status. *Journal of Personality and Social Psychology*. 1966; 3:551–558. [PubMed: 5939604]
- Margolin A, Schuman-Olivier Z, Beitel M, Arnold RM, Fulwiler CE, Avants SK. A preliminary study of spiritual self-schema (3-S(+)) therapy for reducing impulsivity in HIV-positive drug users. *Journal of Clinical Psychology*. 2007; 63:979–999. [PubMed: 17828761]
- Masters KS, Carey KB, Maisto SA, Caldwell PE, Wolfe TV, Hackney HL. Psychometric examination of the brief multidimensional measure of religiousness/spirituality among college students. *The International Journal for the Psychology of Religion*. 2009; 19:106–120.
- McCutcheon, AL. Latent class analysis Quantitative applications in the social sciences series no 64. Thousand Oaks, CA: Sage Publications; 1987.
- Michaelson V, Pickett W, Robinson P, Cameron L. Participation in church or religious groups and its association with health: Part 2: A qualitative, Canadian study. *Journal of Religion and Health*. 2015; 54:1118–1133. [PubMed: 25385319]
- Michaelson V, Robinson P, Pickett W. Participation in church or religious groups and its association with health: A national study of young Canadians. *Journal of Religion and Health*. 2014; 53:1353–1373. [PubMed: 23674243]
- Muthén B. Beyond SEM: General latent variable modeling. *Behaviormetrika*. 2002; 29:81–117.
- Muthén, LK.; Muthén, BO. Mplus user's guide. 6th. Los Angeles, CA: Muthén & Muthén; 1998–2012.
- Nagin, DS. Group-based modeling of development. London: Harvard University Press; 2005.
- Nylund KL, Asparouhov T, Muthén B. Deciding on the number of classes in latent class analysis and growth mixture modeling: A Monte Carlo simulation study. *Structural Equation Modeling*. 2007; 14:535–569.
- Pargament KI, Koenig HG, Tarakeshwar N, Hahn J. Religious coping methods as predictors of psychological, physical and spiritual outcomes among medically ill elderly patients: A two-year longitudinal study. *Journal of Health Psychology*. 2004a; 9:713–730. [PubMed: 15367751]
- Pargament KI, McCarthy S, Shah P, et al. Religion and HIV: A review of the literature and clinical implications. *Southern Medical Journal*. 2004b; 97:776–783. [PubMed: 15352675]

- Pulchalski C, Ferrell B, Virani R, et al. Improving the quality of spiritual care as a dimension of palliative care: The report of the Consensus Conference. *Journal of Palliative Medicine*. 2009; 12:885–904. [PubMed: 19807235]
- Schwartz SJ. The evolution of Eriksonian and neo-Eriksonian identity theory and research. *Identity*. 2001; 1:7–58.
- Szaflarski M, Kudel I, Cotton S, Leonard AC, Tsevat J, Ritchey PN. Multidimensional assessment of spirituality/religion in patients with HIV: Conceptual framework and empirical refinement. *Journal of Religion and Health*. 2012; 51:1239–1260. [PubMed: 21136166]
- Tarakeshwar N, Pearce MJ, Sikkema KJ. Development and implementation of a spiritual coping group intervention for adults living with HIV/AIDS: A pilot study. *Mental Health, Religion, Culture*. 2005; 8:179–190.
- Tuck I, McCain NL, Elswick J. Spirituality and psychosocial factors in persons living with HIV. *Journal of Advance Nursing*. 2001; 33:776–783.
- Varni JW, Burwinkle TM, Seid M, Skarr D. The PedsQL 4.0 as a pediatric population health measure: Feasibility, reliability, and validity. *Ambulatory Pediatrics*. 2003; 3(6):329–341. [PubMed: 14616041]
- Vermunt JK. Latent class modeling with covariates: Two improved three-step approaches. *Political Analysis*. 2010; 18:450–469.
- Walker C, Ainette MG, Wills TA, Mendoza D. Religiosity and substance use: Test of an indirect-effect model in early and middle adolescence. *Psychology of Addictive Behaviors*. 2007; 21:84–96. [PubMed: 17385958]
- Wong YJ, Rew L, Slaike KD. A systematic review of recent research on adolescent religiosity/spirituality and mental health. *Issues in Mental Health Nursing*. 2006; 27:161–183. [PubMed: 16418077]
- Yi MS, Mrus JM, Wade TJ, et al. Religion, spirituality, and depressive symptoms in patients with HIV/AIDS. *Journal of General Internal Medicine*. 2006; 21(Suppl 5):S21–S27. [PubMed: 17083496]

Fig. 1. Latent profiles of religion/spirituality

Table 1
Descriptive statistics of religious/spirituality measures from Brief MMRS (*N* = 104)

Variable	<i>N</i> (%)
<i>Attend religious services</i>	
0 = Never	23 (22.1)
1 = Once or twice a year	15 (14.4)
2 = Every month or so	9 (8.7)
3 = Once or twice a month	11 (10.6)
4 = Every week or more often	39 (37.5)
5 = More than once a week	7 (6.7)
Mean = 2.47 SD = 1.75	
<i>Praying privately</i>	
0 = Never	17 (16.4)
1 = Less than once a month	7 (6.7)
2 = Once a month	5 (4.8)
3 = A few times a month	11 (10.6)
4 = Once a week	7 (6.7)
5 = A few times a week	22 (21.2)
6 = Once a day	17 (16.4)
7 = More than once a day	18 (17.3)
Mean = 4.00 SD = 2.45	
<i>Feel God's presence</i>	
0 = Never or almost	26 (25.0)
1 = Once in a while	12 (11.5)
2 = Some days	16 (15.4)
3 = Most days	10 (9.6)
4 = Every day	24 (23.1)
5 = Many times a day	16 (15.4)
Mean = 2.40 SD = 1.84	
<i>Consider yourself a religious person</i>	
0 = Not religious at all	21 (20.2)
1 = Slightly religious	38 (36.5)
2 = Moderately religious	33 (31.7)
3 = Very religious	12 (11.5)
Mean = 1.35 SD = 0.93	
<i>Consider yourself a spiritual person</i>	
0 = Not spiritual at all	20 (19.2)
1 = Slightly spiritual	43 (41.4)
2 = Moderately spiritual	27 (26.0)
3 = Very spiritual	14 (13.5)
Mean = 1.34 SD = 0.94	

Table 2

Comparisons of different LPA models

Model	AIC	BIC	ABIC	LMR LR <i>P</i> value	ALMR LR <i>P</i> value	BLRT <i>P</i> value
1-Profile LPA	1892.64	1919.09	1887.50	–	–	–
2-Profile LPA	1736.32	1778.63	1728.09	0.0068	0.0079	<0.0001
3-Profile LPA	1705.07	1763.25	1693.75	0.0363	0.0398	<0.0001
4-Profile LPA	1663.47	1737.51	1649.06	0.0203	0.0225	<0.0001
5-Profile LPA	1649.75	1739.66	1632.25	0.3515	0.3651	<0.0001

AIC Akaike information criterion, *BIC* Bayesian information criterion, *ABIC* sample-size-adjusted Bayesian information criterion, *LMR LR* Lo–Mendell–Rubin LR test, *ALMR LR* adjusted Lo–Mendell–Rubin LR test, *BLRT* bootstrap likelihood ratio test
–, not applicable

Table 3
Latent profile assignment probability by profile: 4-profile LPA model ($N = 104$)

	Profile 1	Profile 2	Profile 3	Profile 4
Profile 1 ($N = 25$, 24.2 %)	0.957	0.000	0.025	0.018
Profile 2 ($N = 11$, 10.6 %)	0.000	0.812	0.142	0.046
Profile 3 ($N = 48$, 46.4 %)	0.007	0.001	0.992	0.000
Profile 4 ($N = 20$, 18.9 %)	0.031	0.001	0.000	0.968
Entropy = 0.930				

Latent profile classification is based on the most likely latent class membership

Table 4
Results of equality tests^a of QoL mean scores across latent profiles ($N = 104$)

Variable	Profile 1 (S.E.)	Profile 2 (S.E.)	Profile 3 (S.E.)	Profile 4 (S.E.)	P values
Emotional function	77.54 (2.87)	95.31 (2.05)	79.59 (2.78)	83.14 (3.81)	$P_{12} < 0.001$, $P_{13} = 0.612$, $P_{14} = 0.248$ $P_{23} < 0.001$, $P_{24} = 0.005$, $P_{34} = 0.454$ $P_{\text{Overall}} < 0.001$
Physical function	83.95 (3.13)	92.79 (3.50)	90.11 (1.74)	91.03 (2.83)	$P_{11} = 0.059$, $P_{13} = 0.087$, $P_{14} = 0.097$ $P_{23} = 0.497$, $P_{24} = 0.701$, $P_{34} = 0.782$ $P_{\text{Overall}} = 0.285$
School function	69.65 (3.18)	70.19 (7.01)	72.03 (2.95)	68.10 (4.57)	$P_{12} = 0.944$, $P_{13} = 0.583$, $P_{14} = 0.786$ $P_{23} = 0.812$, $P_{24} = 0.803$, $P_{34} = 0.470$ $P_{\text{Overall}} = 0.887$
Social function	84.96 (2.69)	91.88 (4.41)	91.68 (1.60)	90.55 (3.61)	$P_{12} = 0.182$, $P_{13} = 0.032$, $P_{14} = 0.230$ $P_{23} = 0.965$, $P_{24} = 0.816$, $P_{34} = 0.776$ $P_{\text{Overall}} = 0.424$

P_{12} : Profile 1 versus 2; P_{13} : Profile 1 versus 3; P_{14} : Profile 1 versus 4; P_{23} : Profile 2 versus 3; P_{24} : Profile 2 versus 4; P_{34} : Profile 3 versus 4; P_{Overall} : Overall test

^aEquality tests of means across latent profiles using posterior probability-based multiple imputations with 3 degree(s) of freedom for the overall test and 1 degree of freedom for the pairwise tests