Psychology and Aging
1996, Vol. 11, No. 3, 396-407

0882-7974/96/$3.00

The State Component in Self-Reported Worldviews and Religious Beliefs of Older Adults: The MacArthur Successful Aging Studies

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Meaningful and measurable aspects of short-term intraindividual variability have been established in what are conceptualized to be relatively stable interindividual differences dimensions. Illustrative are anxiety and other temperament traits as well as certain kinds of cognitive abilities. Reclamation of "signal" from the "noise" of intraindividual variability has rested heavily on research designs that involve frequently repeated observations. We extended this line of research to other traitlike domains by examining biweekly self-reports of worldviews and religious beliefs of a sample of elderly participants. The results indicated that not only is there occasion-to-occasion variability in the self-reports but the structure of these fluctuations is consistent over time and bears considerable resemblance to structures reported from cross-sectional data.

Stability-oriented concepts have dominated the individual differences research tradition within psychology. This bent is evidenced not only substantively but methodologically as demonstrated, for example, by the widespread use of test–retest correlations to evaluate the reliability of measurement devices. In the past three decades, however, more and more researchers have begun to look carefully at both longer and shorter term within-person variability as sources of information about how individuals adapt and function as well as how they differ from one another (Valsiner, 1984). These investigations, which have covered a wide variety of behavioral and psychological attributes, often have been reported within the trait–state distinction literature (e.g., Cattell & Scheier, 1961; Horn, 1972; Nesselroade, 1988; Schaefer & Gorsuch, 1993; Singer & Singer, 1972; Spielberger, Gorsuch, & Lushene, 1969; Wessman & Ricks, 1966; Zuckerman, 1976). The studies have revealed that many individual differences dimensions that are traditionally construed to reflect stable among-persons variation also manifest significant occasion-to-occasion intraindividual variability.

Intraindividual variability, even though it is defined and measured over time, contributes to the differences found among persons at a given point in time. How two persons differ today is a function both of how they usually differ and how they happen to be today. For some attributes, the magnitude of intraindividual variability is large in relation to the magnitude of any stable interindividual differences variation. For other attributes, the relative magnitude of intraindividual variability is small and essentially ignorable. On balance, however, the evidence warrants further study and fuller integration of intraindividual variability into research and theorizing about human behavior. We illustrate the extension of this general orientation to the domain of worldviews and religious beliefs via analysis of repeated measurements of a sample of older adults.

Worldviews and Religious Beliefs in the Lives of Older Adults

Jung (1933) noted that ". . . man has, everywhere and always, spontaneously developed religious forms of expression, and . . . the human psyche from time immemorial has been shot through with religious feelings and ideas" (p. 122). From the early days of modern psychiatry, considerable interest has focused on religious behaviors and cognitions and their relationship to mental health. Religion is a cultural force that may affect many different areas of belief and behavior including worldviews and beliefs about health and may influence help-seeking among older adults (Koenig, Moberg, & Kvale, 1988).

A common assumption of both laypersons and many scholars is that, as people approach the end of life they become more religious, but the empirical support for this assumption is equivocal. The Princeton Religion Research Center (PRRC), for instance, reported that religious behaviors and attitudes appear to be more prevalent among persons over the age of 65 than among younger individuals (PRRC, 1976, 1982, 1985). In contrast, based on longitudinal data, Markides, Levin, and Ray (1987) found little evidence that older people increasingly turn to religion as they age, decline in health, and face death. Their results revealed that indicators of religiosity remained fairly stable over time, with the possible exception of religious attendance, which declined slightly among the very old.

Gerontologists study religiosity in part to understand better how feelings of subjective well-being emerge and are maintained in later life. In addition to religiosity tending to be somewhat stable over the life span, it may be related to physical and mental

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This research was supported by the John D. and Catherine T. MacArthur Foundation's Research Network on Successful Aging. We thank Jack McArdle, Steve Aggen, and other members of the Design and Data Analysis group at the University of Virginia for their valuable advice and suggestions.

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health, life satisfaction, and coping behavior (Courtenay, Poon, Martin, Clayton, & Johnson, 1992) as well as stress management (Koenig et al., 1992). A number of cross-sectional studies (Beckman & Howser, 1982; Hunsberger, 1985; Koenig, Kvale, & Ferrel, 1988) and a few longitudinal studies (Blazer & Palmore, 1976; Markides, 1983) have indicated a positive correlation between psychological well-being and religious beliefs among older adults. Not altogether unequivocal findings tend to reflect positive relations between religious attitudes or beliefs and other key variables.

Assessing Religious Beliefs

From a scientific perspective, concepts of religion and religiosity are sources of contention, both substantively and methodologically. For over a century, researchers have had difficulty capturing the depth and breath of this far-flung conceptual domain (Krause, 1993), and the measurement of religiosity remains a persistent problem. One result of the ambiguity has been a proliferation of measures of religious beliefs. The less than satisfactory alternative to the many different scales now available is the use of narrow, operational measures of religious content such as behaviors, measured beliefs, or reports of religious experience (Spilka, Hood, & Gorsuch, 1985). In addition to measurement problems per se, there are research design shortcomings that greatly limit the current knowledge base. For instance, research on religion and aging has suffered from heavy, though not exclusive, reliance on cross-sectional data that confounds the effects of aging with those of cohort membership and period of observation (Markides, 1983). Learning more about the nature and extent of this domain is a necessary prerequisite to resolving some of the existing ambiguity regarding measuring and using the concepts in theoretical frameworks.

Intraindividual Variability

Intraindividual change patterns are the basic stuff of development, and their study involves the application of the research methodologies of differential and experimental psychology (Baltes, Reese, & Nesselroade, 1977). Patterns of intraindividual change of interest to developmentalists have been further divided into two major kinds, intraindividual variability and intraindividual change (Nesselroade, 1991; Nesselroade & Featherman, 1991). The former represents the base condition—the "hum"—of the living system on which the latter is superimposed. Moreover, alterations in intraindividual variability patterns can also signify impending intraindividual changes as described, for example, by Siegler (1994).

In the past three decades, researchers have investigated short-term intraindividual variability not only in traditional domains such as affect, emotion, and mood (Larsen, 1987; Lebo & Nesselroade, 1978; Wessman & Ricks, 1966; Zevon & Tellegen, 1982), but also in domains that are usually assumed to reflect stable attributes such as human abilities (Hampson, 1990; Horn, 1972), cognitive performance (May, Hasher, & Stoltzfus, 1993; Siegler, 1994), self-concept (Hooker, 1991), locus of control (Roberts & Nesselroade, 1986), temperament (Hooker, Nesselroade, Nesselroade, & Lerner, 1987), and work values (Schulenberg, Vondracek, & Nesselroade, 1988). The findings from these studies indicate that there exist coherent, systematic patterns of short-term intraindividual variability for many different kinds of psychological attributes. To the extent that the short-term intraindividual fluctuations are asynchronous across individuals, that variability is inextricably confounded with the variability of any stable interindividual differences among individuals manifested at a single occasion of measurement.

Moreover, individuals may differ quite predictably in the magnitude, periodicity, or other characteristics of their fluctuations, and these differences are possibly predictive of other among-persons differences. The essential idea is only some of the individual's many attributes are relatively stable and others are not. Yet, at a given moment, both kinds of attributes are involved in characterizing the person and determining his or her behavior.

Objectives of the Present Study

Much adult development and aging research has used general dimensions of interindividual differences to classify older persons into diagnostic groups, to predict longevity and mortality, and, more broadly, to understand the nature of development and change. The study of intraindividual variability in ostensibly interindividual differences dimensions can also provide useful information about their nature and function. Indeed, intraindividual variability represents an additional class of variables on which individuals may reliably differ from one another. These differences may themselves be valuable prediction and classification variables. Worldviews and religious beliefs, in part due to their possible mediating role between the onset of traumatic events such as loss of health, job, or spouse, and the person's subsequent adaptation later in life, constitute a promising domain within which to explore intraindividual variability concepts.

With regard to the nature of changes in worldviews and religious beliefs over time, many researchers have argued that religious attitudes tend to remain stable into late old age. Generally absent, however, are examinations of intraindividual variability in religious attitudes and beliefs. For example, religious coping typically has been conceptualized in terms of dispositions or traits that describe the extent and manner in which an individual's faith becomes involved in the problem-solving process. However, Schaefer and Gorsuch (1993) used the state–trait approach to investigate differences in religious coping styles and showed that the degree of religious coping changes according to situational factors. Much remains to be done, however, before the nature of intraindividual variability or short-term changes in religious beliefs will be sufficiently understood to permit its integration into theories of aging.

The general objective of this study was to examine empirically the nature of short-term intraindividual variability in worldviews and religious beliefs and the extent to which it is structured and coherent, rather than random and noisy. Based on a weekly measurement protocol, we examined "natural" intraindividual variability manifested in a set of worldviews and religious beliefs reported by a sample of elderly persons. More specifically, we investigated both the extent to which self-re-

ports of worldviews and religious beliefs vary on a short-term basis and key structural characteristics of these self-ratings. Although our principal emphasis in this report is methodological and intended to illustrate the study of short-term intraindividual variability, the substantive implications of the findings, some of which are discussed in the final section of the article, should not be overlooked.

Method

The data reported here were drawn from a multivariate, replicated, single-subject repeated measurement (MRSRM) design that was implemented to explore aspects of successful aging in a retirement community, Cornwall Manor, located in Cornwall, Pennsylvania. The research project was designed to study the magnitude and nature of short-term intraindividual variability and stability manifested by older adults.

Sample

The participants were 57 volunteers who resided at Cornwall Manor. Members of the sample, which was comprised of 39 women and 18 men, were on average 77 years of age (SD = 7.2). Generally, the educational level of participants was high (M = 13.8 years), and health status was good.

Measures

The measures spanned the biomedical, physical, cognitive performance, activity, mood-state, and attitudinal domains. Many of the measures are part of a test battery developed under the auspices of the MacArthur Foundation Research Program on Successful Aging (Berkman et al., 1993). Other variables were taken from a survey instrument of the Americans' Changing Lives study of productive behaviors in a national probability sample of adults (Herzog, Kahn, Morgan, Jackson, & Antonucci, 1989). The nine items used to assess worldviews and religious beliefs are presented in the Appendix. The response format was a 4-point Likert-type rating scale with response alternatives ranging from 1 (*strongly disagree*) to 4 (*strongly agree*). The items tend to factor into two dimensions identifiable as (a) fatalism, believing in a world that is governed by external forces, such as fate or an active God; and (b) justice, believing that people generally get what they deserve (Rubin & Peplau, 1975).

Procedures

Apprehending the nature of intraindividual variability requires intensive measurement (many variables, many occasions) designs. In the present study, participants were divided randomly (as nearly as possible given scheduling and time conflicts) into 2 groups: a longitudinal group (n = 32) and a retest–control group (n = 25). The longitudinal group, platooned into Monday-Wednesday-Friday and Tuesday-Thursday-Saturday subgroups, was measured weekly on the battery of measures described earlier for a total of 25 weeks (occasions). Members of the Monday-Wednesday-Friday platoon were measured approximately an equal number of times on each of the 3 days over the testing period. Similarly, members of the Tuesday-Thursday-Saturday platoon were measured about a third of the time on Tuesdays, about a third of the time on Thursdays, and about a third of the time on Saturdays. Due to holiday breaks, 27 weeks were required to obtain the 25 measurements. The retest–control group was measured only twice: at the 1st week and at the last week of longitudinal group measurement.

To increase the breadth of the test battery, some of the measures were administered only on alternate weeks. The worldviews and religious beliefs items fell in this category. Thus, the maximum number of occasions of measurement involving these items was 13. On the 1st and the 25th occasions of measurement, the entire test battery was administered to all of the participating individuals (both longitudinal and retest–control group members). The presentation of testing materials was organized and prompted by means of laptop computers that allowed updating information, branching, and cueing the testers when appropriate (Mullen, Orbuch, Featherman, & Nesselroade, 1988). Responses were recorded immediately on the laptops and then electronically transferred to a core data storage facility each day.

Analyses and Results

Data Analysis Overview

In addition to providing basic descriptive information, the data analyses were aimed at two principal objectives. The first objective was to evaluate the appropriateness of assuming that our measurement battery was measuring the same thing across the 25 weeks of measurement, thus providing some justification for collapsing the biweekly (in the case of worldviews and religious beliefs) measurements into indices of intraindividual variability and stability to characterize each person over time. This was accomplished by comparing the factor structures of the responses on the first and the last (25th week) occasions of measurement. For this purpose, we used the data of both the longitudinal and retest–control groups.

The second principal data analytic objective was to examine the structure of interindividual differences in the patterns of intraindividual variability and stability. For this, we fit a factor analytic model to data that described intraindividual stability and variability, respectively, across the measurement sequence. Several ancillary analyses that were undertaken to clarify further the findings are presented and discussed.

Descriptive Statistics

Elementary descriptive statistics are presented in Table 1 by item. The basic data have been parceled into three nonoverlapping sets, Occasion 1, Occasion 25, and stability and variability scores (Intra M and Intra SD, respectively) based on the occasions of measurement intervening between Occasions 1 and 25. The Intra M score is the mean of a given individual's intervening biweekly measurements. Similarly, the Intra SD score is the standard deviation of the individual's intervening biweekly measurements. Thus, the Intra M and Intra SD scores do not include the Occasion 1 and Occasion 25 data. Due to some missing data, the actual number of time points contributing to a given analysis varied across subjects and variables.

Obviously, the means and standard deviations of the Intra M and Intra SD scores presented in Table 1 are rather abstract statistics, but, nevertheless, they provide useful summary information regarding the nature of the data. In the context of the trait–state distinction, the Intra M scores can be thought of as estimates of trait scores, because they are averages over time (and situation) for each individual. The Intra SD scores can be thought of as reflecting the amount of state variability manifested over the weeks intervening between the first and last occasions of measurement.

Table 1
Descriptive Statistics for the Worldviews and Religious Beliefs

Variable	Occasion 1			Occasion 25			Intra *M* ($n = 32$)		Intra *SD* ($n = 31$)[a]	
	n	*M*	*SD*	*n*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Not wonder why (NWW)	57	2.74	.92	52	2.77	.78	2.70	.62	.46	.30
Die when it's the time (DWT)	57	2.84	1.13	53	2.68	.89	2.80	.80	.45	.23
All plan of God (APG)	57	2.89	1.11	51	2.94	.86	2.90	.83	.41	.21
Sacrificed for future (SFF)	57	2.51	.97	51	2.39	1.00	2.47	.72	.43	.24
Bad things meant to be (BMB)	57	2.07	1.02	52	2.29	.89	2.27	.80	.46	.24
Deserve what you get (DWG)	57	2.16	.88	53	2.23	.95	2.26	.70	.45	.20
Misfortune brought on (MBO)	57	3.00	.76	53	2.79	.74	2.89	.55	.43	.19
Good people rewarded (GPR)	57	3.18	.73	52	2.85	.87	2.80	.75	.47	.15
Work hard good future (WGF)	57	2.19	.85	51	2.27	.80	2.37	.56	.44	.30

Note. Intra *M* = stability score; Intra *SD* = variability score.
[a] One participant was excluded for having available data only on three items.

Factor Structure of Worldviews and Religious Beliefs Data

As a preliminary step in studying the factor structures of the worldviews and religious beliefs items, exploratory factor analyses were performed on the data obtained at the first and last occasions of measurement. Using the joint criteria of scree plot and interpretability, two factors readily interpretable as Fatalism and Justice were accepted as describing the data of the first and last occasions of measurement.

Guided by the results of the exploratory factor analysis, we first estimated measurement models for the two occasions and for the Intra *M* and Intra *SD* data separately, using LISREL 7 (Jöreskog & Sörbom, 1989). This initial model fitting emphasized the general patterning of salient versus nonsalient loadings rather than strict factor invariance. Figure 1 shows the results of fitting an oblique two-factor solution separately to the Occasion 1 and Occasion 25 covariance matrices. Figure 2 shows the corresponding information for the intraindividual means and intraindividual standard deviations. The factor loadings are represented by one-headed arrows between the factors and the variables. Variances, covariances, and uniquenesses, illustrated with two-headed arrows, indicate nondirectional relationships for factors with themselves (variances), with other factors (covariances), and unique variances of the variables, respectively.

To establish a metric for the factors, one of the manifest variables for each factor was assigned a loading of 1.00. Thus, all other loadings for a given factor are ratios of the unit loading. The overall goodness of fit of a model to the data was evaluated by the chi-square values and their associated degrees of freedom. Chi-square to degrees-of-freedom ratios of less than 2 are generally taken as indicative of good fit (e.g., Bollen, 1989). In addition, the goodness-of-fit index (GFI; Jöreskog & Sörbom, 1986), which measures the relative amount of the variance and covariance in observed data that is predicted by the model, was used.

The goodness-of-fit indices presented in Figure 1 suggest that the measurement specification provides an adequate fit to the Occasion 1 and Occasion 25 data. As can be seen in Figure 2, the common factor model also fits the Intra *M* data about as well as the individual occasion data, showing similar loading patterns for two factors. Somewhat striking, however, is the degree to which the same general model also fits the short-term variability (Intra *SD*) data. It bears reiterating that the model we are fitting at this point only distinguishes between which loadings are constrained to be zeros and which loadings are to be estimated from the data (configural invariance). Thus, the similarity of the patterns of loadings for Occasions 1 and 25, Intra *M*, and Intra *SD* is not based on a strict metric invariance but, rather, rests on the configuration of salient versus nonsalient loadings. Nevertheless, inspection of the LISREL estimates of the completely standardized solutions (in which both observed and latent variables are standardized) revealed that, with two exceptions, the overall configuration of the factor loading pattern for the Intra *SD* data displays a compelling similarity to those of the separate occasions and the Intra *M* estimates. The two exceptions are the loading for BMB (bad things meant to be) on Fatalism and the loading for DWG (deserve what you get) on Justice. One additional disparity between the parameter estimates for the Intra *SD* model versus the other three models is the much smaller magnitude of the factor variances of the Intra *SD* model. With regard to general pattern of salient versus nonsalient loadings, however, the results indicate more consistency than inconsistency in the factorial characterizations of the different kinds of variables (single occasion, mean over time, and standard deviation over time).

Examination of Measurement Equivalence

Measuring repeatedly for 25 weeks raises concerns about the nature of the scores and the meaningfulness of analytic operations performed on them. To check more precisely on the nature of what was being measured by the battery at the end of the measurement series compared to the beginning, we focused more rigorously on the comparison of Occasion 1 and Occasion 25 data. To give the reader a feel for this comparison, the correlations among the variables at Occasion 1, at Occasion 25, and between these two occasions are provided in Table 2. The correlation matrix has been partitioned into three submatrices:

one square submatrix showing the cross-correlations between Occasion 1 and Occasion 25 scores and two triangular submatrices containing the within-occasion correlations. The diagonal elements (boldface) of the lower left submatrix are the item test–retest correlations. As indicated in Table 1, there were several nonrespondents at Occasion 25. For these missing entries, we substituted the group mean of a given variable at Occasion 25.

The intercorrelations among the Intra *M* scores, among the Intra *SD* scores, and between these two sets of scores are presented in Table 3. Table 3 is organized in a manner analogous to that of Table 2. Each diagonal entry (boldface) of the lower left submatrix of Table 3 is the correlation between the Intra *M* and Intra *SD* scores for a given variable. The intercorrelations among the Intra *M* scores are generally higher than the intercorrelations among the Intra *SD* scores (upper left and lower right triangular submatrices, respectively).

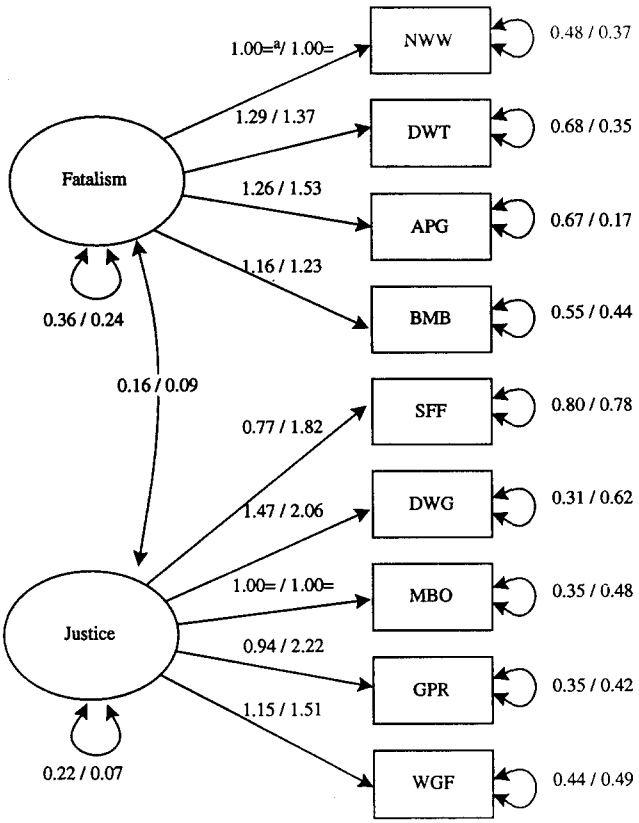

Figure 1. Maximum likelihood estimation of two-factor model for Occasion 1 data and Occasion 25 data. Circles represent latent variables (factors), rectangles represent manifest variables, and two-headed arrows on rectangles represent uniqueness. Parameter estimates for the Occasion 1 data are on left; parameter estimates for the Occasion 25 data are on right. Occasion 1: Goodness-of-fit index (GFI) = 0.89; χ^2 (26, N = 57) = 32.84, p = 0.167. Occasion 25: GFI = 0.82; χ^2 (26, N = 51) = 52.48, p = 0.002. NWW = not wonder why; DWT = die when it's the time; APG = all plan of God; SFF = sacrificed for future; BMB = bad things meant to be; DWG = deserve what you get; MBO = misfortune brought on; GPR = good people rewarded; WGF = work hard good future. [a]The equal sign indicates a fixed parameter.

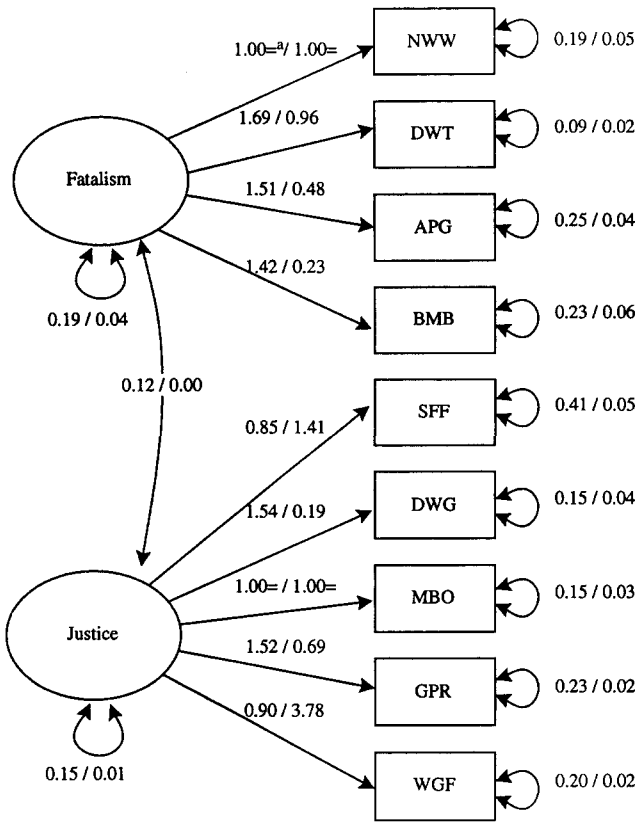

Figure 2. Maximum likelihood estimation of two-factor model for Intra *M* data and Intra *SD* data. Parameter estimates for Intra *M* data are on left; parameter estimates for Intra *SD* data are on right. Intra *M*: χ^2 (25, N = 32) = 50.52, p = 0.002. Goodness-of-fit index (GFI) = 0.76. The factor structure model produced significantly better fit when one covariance of errors was introduced (the covariance of NWW1 ↔ BMB1 = .14). Intra *SD*: GFI = 0.82; χ^2 (26, N = 51) = 37.69, p = 0.065. NWW = not wonder why; DWT = die when it's the time; APG = all plan of God; SFF = sacrificed for future; BMB = bad things meant to be; DWG = deserve what you get; MBO = misfortune brought on; GPR = good people rewarded; WGF = work hard good future. [a]The equals sign indicates a fixed parameter.

The essential measurement equivalence question was: Can one fit the same factor loading pattern to the data from the 1st and the 25th occasions of measurement? A finding of invariant factor loading patterns would offer support for the interpretation that the latent structure of the variables across the 25 weeks of measurement had not changed, thus lending credence to the calculation of stability and intraindividual variability indices on the scores representing the intervening biweekly occasions of measurement. The model-fitting procedures also had to respect the fact that the Occasion 1 and Occasion 25 data represented repeated measurements, so the data of these two occasions were modeled as dependent rather than independent information.

This investigation of the integrity of the measurement structure was conducted by fitting a longitudinal factor model (McArdle & Nesselroade, 1994) to the Occasion 1 and Occasion 25 data. A common factor model was fitted to the 18 × 18 covariance scaling of the matrix shown in Table 2. This was

Table 2
Correlations of Within- and Between-Occasions (Occasion 1 and Occasion 25) Measures

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1. NWW_1[a]	—																	
2. DWT_1	.42	—																
3. APG_1	.43	.54	—															
4. SFF_1	.19	−.06	.20	—														
5. BMB_1	.50	.43	.42	.15	—													
6. DWG_1	.19	.29	.25	.20	.39	—												
7. MBO_1	.34	.19	.04	.27	.33	.56	—											
8. GPR_1	.26	.27	.35	.22	.27	.45	.32	—										
9. WGF_1	.23	.29	.34	.40	.25	.48	.28	.40	—									
10. NWW_{25}[b]	**.61**	.32	.42	.26	.45	.33	.30	.34	.30	—								
11. DWT_{25}	.41	**.61**	.48	.19	.45	.19	.18	.31	.18	.44	—							
12. APG_{25}	.51	.50	**.59**	.40	.51	.25	.38	.35	.33	.51	.64	—						
13. SFF_{25}	.07	.05	.36	**.34**	.01	.08	.13	.15	.18	.15	.23	.32	—					
14. BMB_{25}	.40	.28	.33	.31	**.62**	.23	.19	.25	.22	.42	.58	.52	.13	—				
15. DWG_{25}	.22	.24	.19	.09	.28	**.40**	.30	.29	.15	.46	.31	.33	.10	.37	—			
16. MBO_{25}	.13	.07	.12	.21	.10	.33	**.41**	.20	.10	.25	.30	.23	.11	.28	.39	—		
17. GPR_{25}	.23	.20	.32	.26	.23	.32	.33	**.65**	.27	.34	.16	.45	.32	.24	.46	.07	—	
18. WGF_{25}	.14	.07	.40	.39	.12	.23	.15	.24	**.45**	.01	.08	.35	.49	.29	.09	.15	.34	—

Note. Boldface indicates the correlation between Occasion 1 and Occasion 25 scores for a given variable. NWW = not wonder why; DWT = die when it's the time; APG = all plan of God; SFF = sacrificed for future; BMB = bad things meant to be; DWG = deserve what you get; MBO = misfortune brought on; GPR = good people rewarded; WGF = work hard good future.
[a] Occasion 1 score. [b] Occasion 25 score.

done as follows: A four-factor model was specified. Two of the factors were constrained to load only the Occasion 1 variables in a pattern consistent with the outcome of the exploratory factor analysis. The second pair of factors was constrained to load only the Occasion 25 variables but in precisely the same pattern and values as the loadings of the first two factors on the Occasion 1 variables. In accord with the exploratory factor analysis results, one factor was specified as Fatalism and the other as Justice.

As described earlier, each factor was constrained to load one of the variables by the amount 1.00 to establish a metric for the common factors. All other estimates of loadings for a given factor and the factor variances were scaled proportionally to this

Table 3
Correlations of Within- and Between-Stability and Variability Measures

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1. NWW_M[a]	—																	
2. DWT_M	.71	—																
3. APG_M	.44	.74	—															
4. SFF_M	−.04	.11	.31	—														
5. BMB_M	.85	.75	.60	.22	—													
6. DWG_M	.55	.58	.56	.36	.61	—												
7. MBO_M	.19	.46	.55	.44	.27	.56	—											
8. GPR_M	.34	.49	.60	.22	.35	.67	.49	—										
9. WGF_M	.05	.29	.27	.56	.15	.43	.52	.53	—									
10. NWW_{SD}[b]	**−.56**	−.39	−.49	.01	−.52	−.35	−.21	.29	—	—								
11. DWT_{SD}	−.44	**−.28**	−.29	−.04	−.38	−.38	−.07	−.27	.07	.50	—							
12. APG_{SD}	−.35	−.17	**−.13**	−.18	−.28	−.07	−.08	−.13	−.06	.26	.36	—						
13. SFF_{SD}	.25	.17	.09	**.02**	.11	.27	.22	.19	.01	.11	.01	−.31	—					
14. BMB_{SD}	.08	.38	.16	.26	**.26**	.18	.26	−.15	.18	.04	.09	.12	.19	—				
15. DWG_{SD}	.10	.10	.06	.21	.19	**−.17**	.23	−.03	.16	−.16	−.01	−.21	−.01	.04	—			
16. MBO_{SD}	−.06	−.06	−.36	−.04	−.10	−.15	**−.06**	−.38	−.29	.12	.19	.36	−.01	.31	.02	—		
17. GPR_{SD}	.01	−.20	−.23	−.04	−.06	−.09	.16	**−.21**	−.14	−.12	.02	.09	.10	−.10	.33	.37	—	
18. WGF_{SD}	−.13	−.14	−.21	−.01	−.08	−.16	.09	−.19	**−.08**	.22	.21	.01	.37	.52	.04	.29	.24	—

Note. Boldface indicates the correlation between Intra *M* (stability) and Intra *SD* (variability) scores for a given variable. NWW = not wonder why; DWT = die when it's the time; APG = all plan of God; SFF = sacrificed for future; BMB = bad things meant to be; DWG = deserve what you get; MBO = misfortune brought on; GPR = good people rewarded; WGF = work hard good future.
[a] Intra *M* score (stability index). [b] Intra *SD* score (variability index).

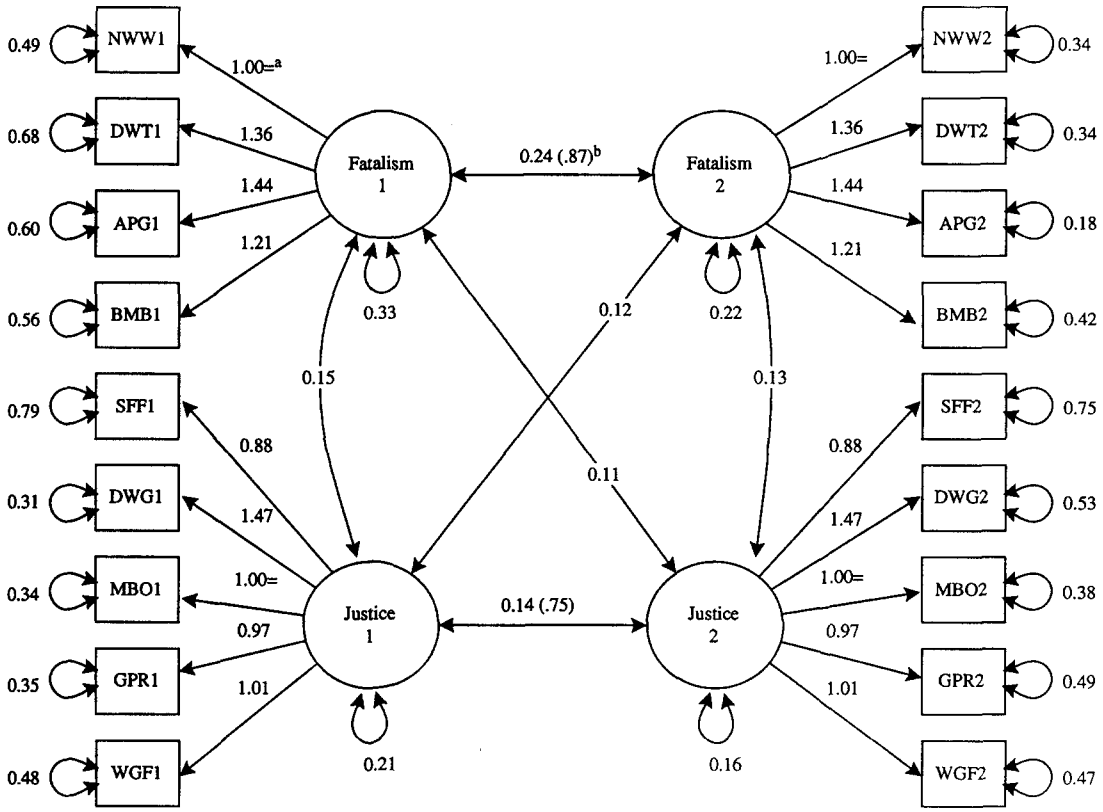

Figure 3. Maximum likelihood estimation of factor invariance model for the Occasion 1 and Occasion 25 data. The 1 and 2 inside circles represent Occasion 1 and Occasion 25, respectively. Goodness-of-fit index = 0.76; χ^2 (131, N = 57) = 168.14, p = 0.016. For clarity of presentation, the following significant covariances of errors are not shown: NWW1 ↔ NWW2 = .17; DWT1 ↔ DWT2 = .19; BMB1 ↔ BMB2 = .23; GPR1 ↔ GPR2 = .23; and WGF1 ↔ WGF2 = .18. NWW = not wonder why; DWT = die when it's the time; APG = all plan of God; SFF = sacrificed for future; BMB = bad things meant to be; DWG = deserve what you get; MBO = misfortune brought on; GPR = good people rewarded; WGF = work hard good future. [a]The equals sign indicates a fixed parameter. [b]The numbers in parentheses are factor intercorrelations.

value. Additional specifications were postulated based on the hypothesized nature of the factor interrelationships and the unique variances of each variable. These will be described in more detail later.

In Figure 3, the LISREL estimates of a two-factor model fitted to the Occasion 1 and Occasion 25 data are presented. The model allowed the two factors to correlate with each other both within and across occasions. In addition, the uniquenesses were allowed to covary between the corresponding variables across the two time points. By constraining the corresponding factor loadings between Occasion 1 and Occasion 25 to be equal, we tested the metric invariance (McArdle & Nesselroade, 1994; Meredith, 1993) of the loadings across the two measurement occasions. This oblique two-factor model fitted the data reasonably well on the basis of the chi-square to degrees-of-freedom ratio (see Figure 3).

We concluded that the latent structure of the worldviews and religious beliefs measures was invariant across the span of repeated measurements. This information concerning the invariance of the latent structure of the items over time is supplemented by the (test–retest) stability of the factor scores between Occasions 1 and 25—.87 for Fatalism, and .75 for Justice. Overall, the results from the analyses of factor structure, implying the invariance of the measurement structure across time, provided an adequate rationale for calculating and analyzing intraindividual variability (Intra *SD*) and stability (Intra *M*) indices computed across the measurement occasions intervening between Occasions 1 and 25. We turn to those analyses next.

The Structure of Intraindividual Variability and Stability Measures

To examine the latent structure of individual differences in short-term variability and stability of worldviews and religious beliefs measures, we followed a procedure similar to that just described except that, instead of two occasions of measurement, the analyses were focused on the two sets of derived scores representing stability and intraindividual variability. The former was represented by what we referred to earlier as Intra *M* and the latter by Intra *SD*. Because the two sets of indices are

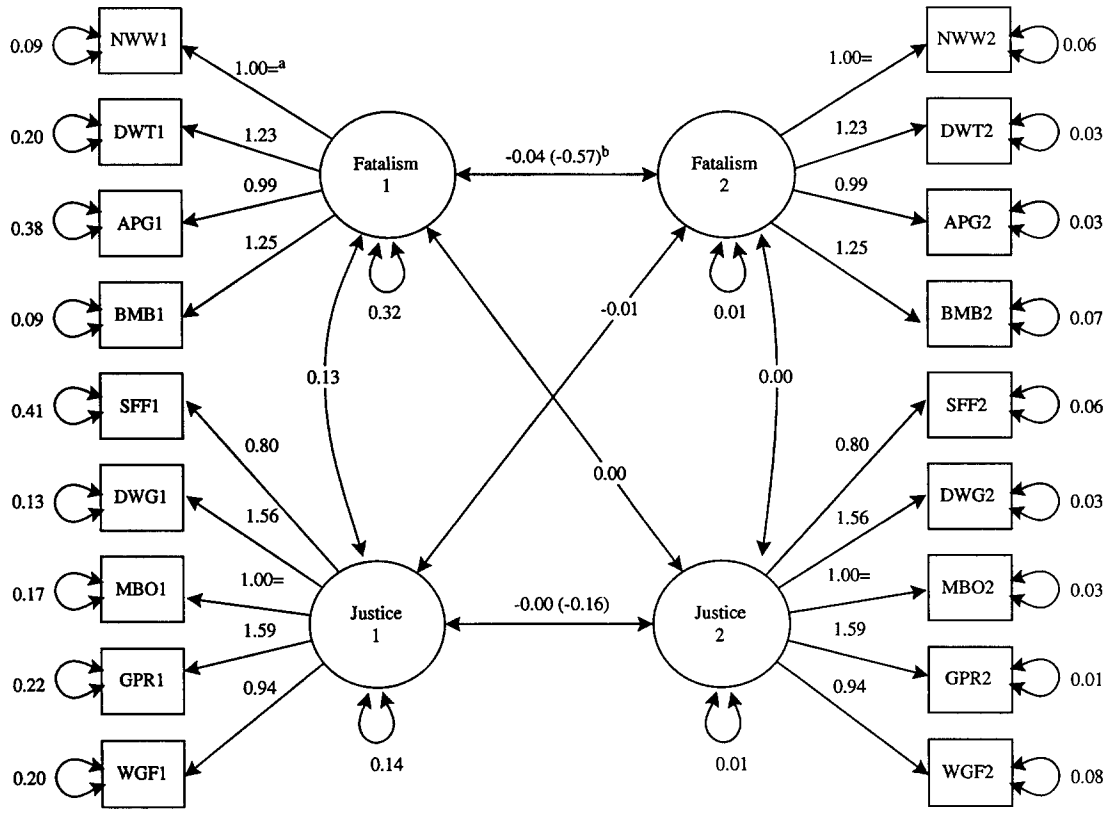

Figure 4. Maximum likelihood estimation of factor invariance model for the Intra *M* and Intra *SD* data. The 1 and 2 inside circles represent Intra *M* and Intra *SD*, respectively. Goodness-of-fit index = 0.61; χ^2 (136, N = 31) = 246.21, p = 0.00. NWW = not wonder why; DWT = die when it's the time; APG = all plan of God; SFF = sacrificed for future; BMB = bad things meant to be; DWG = deserve what you get; MBO = misfortune brought on; GPR = good people rewarded; WGF = work hard good future. [a]The equals sign indicates a fixed parameter. [b]The numbers in parentheses are factor intercorrelations.

computed from the same scores, they are dependent, so the general form of the factor analysis remained the same as that for Occasion 1 and Occasion 25 data.

The model shown in Figure 4 involved fitting the two-factor model to the stability–variability data. The same factor pattern described for Occasions 1 and 25 was fitted to the covariance matrix reflecting the interrelationships of the stability and variability indices. Similar to the first application, this model allowed the two factors to correlate both within and across data sets. Thus, in this case, we allowed that there might be correlations between the level of the average responses (Intra *M*) and the magnitude of the biweekly variations (Intra *SD*) at the factor level. It proved to be unnecessary to estimate nonzero correlations between corresponding Intra *M* and Intra *SD* uniquenesses. Although we had no strong theoretical reason for doing so, we imposed equality constraints on the corresponding factor loadings between Intra *M* and Intra *SD* data to test the invariance of the pattern of loadings.

As illustrated in Figures 3 and 4, in the worldviews and religious beliefs data, the invariant model did not appear to fit the Intra *M* and Intra *SD* data as well as the Occasion 1 and Occasion 25 data, although the former showed the chi-square to degrees-of-freedom ratio less than 2 (it should also be noted that the sample size was smaller for Intra *M* and Intra *SD* data than for Occasion 1 and Occasion 25). Contrary to the situation with the Occasion 1 and Occasion 25 factors, under the specification of invariant loadings, the factor intercorrelations between Intra *M* and Intra *SD* measures show a moderate inverse relationship for Fatalism (r = −.56) and a relatively weak, but inverse, association for Justice (r = −.16). We further checked on this inverse relationship by estimating the correlations between the intraindividual variability factors and the Occasion 1 factors. Those estimates were −.67 and −.30, respectively, and quite in line with the values reported for the Intra *SD* and Intra *M* factors. Thus, the initially high scorers tended to show less variability across time, whereas the initially low scorers tended to show more variability across time. More specifically, elderly people who were on average high on Fatalism (or Justice) over time tended to maintain their stronger fatalism or (justice) beliefs, whereas those who had relatively weaker fatalism (or justice) beliefs tended to exhibit greater fluctuations over time. Unfortunately, our data do not provide an unambiguous answer to the question whether the inverse relationship reflects a ceiling effect in the measurements or less wavering over time in strongly held ideas and more wavering over time in less strongly held ones. The more wavering interpretation is a plausible substantive interpretation of the nature of the relationship.

Table 4
Factor Model-Fitting Results for Individual Occasion Data

		Goodness of fit			
Occasion	*n*	χ^2	GFI	*df*	*p*
1st	32	28.70	.84	26	.325
2nd	32	33.14	.85	26	.158
3rd	30	48.72	.77	26	.004
4th	30	29.41	.81	26	.293
5th	29	50.47	.75	26	.003
6th	29	36.64	.80	26	.081
7th	29	55.62	.72	26	.001
8th	29	56.52	.76	26	>.0001
9th	29	61.26	.72	26	>.0001
10th	29	85.45	.67	26	>.00000002
11th	26	47.11	.74	26	.007
12th	20	47.17	.67	26	.007
13th	31	38.62	.78	26	.053

Note. GFI = goodness-of-fit index.

We also examined the degree to which Intra *SD* scores tended to be stable over time. In other words, do the high variability persons tend to remain so across time or do people show high variability over some intervals and low variability over other intervals? To provide an initial answer to this question, for each of the nine items, we computed two Intra *SD* scores for each person, one based on the first seven occasions and the other on the last six occasions of measurement. The correlations between these two scores (test–retest at the level of intraindividual variability) ranged from .16 to .54, with the average of $r = .30$ over all nine items. An attempt to fit the invariant two-factor (Fatalism and Justice) model to these data was moderately successful,[1] $\chi^2(136, N = 32) = 236.86$, $p = .1 \times 10^{-6}$, GFI = .61.

Comparison of Inter- and Intra Magnitudes

An obvious question concerning intraindividual variability is: How does it compare in magnitude to interindividual differences variance? To the extent that biweekly fluctuations are asynchronous across individuals, intraindividual variability is confounded with interindividual differences at any given occasion of measurement. In Table 1, the comparison between the magnitude of the standard deviation of each occasion and the magnitude of the average of Intra *SD* at the item level reveals that intraindividual variability, which reflects both state and error variation, tends to be half or more as large as single-occasion interindividual differences variance that includes trait, state, and error variance as well as any covariances of these sources. Taking the difference between the former and the latter as a rough estimate of trait variance suggests that state variation on worldviews and religious beliefs items is by no means trivial. More precise decompositions of the variability into state and trait variance for each measurement occasion is underway for the various measures used in the project.

Additional Structural Analyses

For the purpose of further cross-checking the robustness of the measurement structure, we fitted the two-factor model of Figure 1 and Figure 2 to each of the 13 occasions of data individually. Only the longitudinal group's data could be used for this purpose. This further model fitting was theoretically informative, because it tended to corroborate the factor solution across each of the measurement occasions. Table 4 presents a summary of the results of fitting the model to the individual occasion's data. The worldviews and religious beliefs data appear to have a robust measurement structure.

Discussion and Conclusions

Our major concern has been to explore the latent structure of individual differences in short-term intraindividual variability of self-reported religious beliefs and worldviews in a sample of older adults. The results of this investigation are rather clear-cut. Individuals' self-reports on attributes that are generally presumed to represent quite stable interindividual differences, in this case, worldviews and religious beliefs, do vary from occasion to occasion. Moreover, the intraindividual variation is systematic in at least two ways. First, it is patterned across variables in that the factorial description of intraindividual variability scores tends to reflect the factorial description of the corresponding single-occasion interindividual differences scores. By "tends to reflect" we mean that, with only a couple of exceptions, the salient versus nonsalient loadings of the factor pattern of the standard deviations of many repeated instances of single-occasion scores correspond to salient versus nonsalient loadings of the factor pattern of those single-occasion scores. Second, the intraindividual variation is systematic across time in that the highly variable individuals over one subset of occasions tend to be the highly variable individuals over a subsequent subset of occasions, whereas the persons manifesting smaller amounts of variability over one subset of occasions tend to be the ones manifesting smaller amounts of variability over a subsequent subset of occasions.

With regard to the similarity between the patterning of interindividual variability across variables and the patterning of interindividual differences across variables, Cattell (1966) noted that one should expect to find similarities between the patterns of how individuals change and the patterns of how individuals differ from each other. Horn (1972) demonstrated that there are similarities between the state and trait counterparts of fluid and crystallized intelligence. Findings concerning the latent structure of several gait and balance and physiological measures (Nesselroade, Featherman, Aggen, & Rowe, 1995) also parallel those reported here for worldviews and religious beliefs.

The nature of intraindividual variability implies, but does not prove, that short-term fluctuations themselves are not merely noise to be abandoned or ignored but rather information to be studied in its own right. Presumably, various features of this intraindividual variability (e.g., magnitude, periodicity) are interindividual differences that can be used for prediction

[1] Fitting the model involved constraining the unique variance of NWW15 (not wonder why, Occasion 25), which was estimated to be slightly negative, to 0.0 and allowing the unique variance of WGF1 (work hard good future, Occasion 1) to covary with its Occasion 25 counterpart, the unique variance of WGF25 (work hard good future, Occasion 25).

as well as diagnosis and classification of older individuals (Nesselroade & Hershberger, 1993). At the other end of the life span, for example, researchers have been attempting for some time to use differences in intraindividual variability patterns to predict later outcomes. Fox and Porges (1985), for instance, have investigated linkages between infant's heart rate variability and later behavior. In older adults, Mulligan (1995) found that interindividual differences in intraindividual variability in selected physical characteristics was a strong predictor of mortality 5 years later.

The possible roles of intraindividual variability involve the differential prediction of the impact of life events in later years (such as retirement, bereavement, or disabling illness). For example, differential outcomes of individual's adjustment to what are objectively the same events might in part reflect the different status of dimensions of intraindividual variability at the time of the event (Nesselroade, 1991). Whether or not some negative event becomes "the final straw" for an individual could be a function of whether he or she is "up" or "down" at the time the event occurs. Obviously, more thorough knowledge about the nature of intraindividual variability is needed before its value in making predictions and designing interventions relevant to older people can be evaluated.

The apparent patterning of interindividual differences in intraindividual fluctuations raises interesting questions regarding some of our most deeply held beliefs about the nature of the organism. For a century or more, the technical tools for studying individual differences in behavior (e.g., measurement theory) have been dominated by stability concepts—in one case to the point that the measurement of change was argued to be not merely difficult but inappropriate (e.g., Cronbach & Furby, 1970). However, more and more empirical evidence and conceptual argument is accruing that fundamental aspects of behavior need to be defined in terms of patterns of intraindividual variability rather than stability (e.g., Cattell, 1963; Horn, 1972; Lamiell, 1981; Larsen, 1987; Nesselroade, 1991; Shoda, Mischel, & Wright, 1994; Valsiner, 1984). Our results are consistent with a portrayal of the organism as fundamentally changing and varying, a portrayal that recognizes stability as a special case, rather than the other way around. A shift from static to more dynamic concepts is consistent with what others have described as a natural progression in the development of a science (e.g., West, 1985).

Because so much psychological research is cross-sectional in design, researchers need to remain alert to the fact that the magnitude of intraindividual variability tends to be underestimated in relation to interindividual differences variation, because estimates of the latter based on only one occasion of measurement contain the former, assuming that fluctuations are asynchronous across individuals. Indeed, our findings suggest that the amount of intraindividual variability in religious beliefs and worldviews compares favorably with the magnitude of stable interindividual differences variation.

Substantively, research on religious beliefs or religious coping has been heavily one-sided. Although there have been numerous investigations involving religious coping as a traitlike set of attributes, little has been done to focus on situational determinants and short-term variations therein. A previous study conducted by Schaefer and Gorsuch (1993) demonstrated the existence of religious coping style variations based on situational factors and individual characteristics. Along the same line, our findings underscore a strong intraindividual variability component to self-reported religiosity. Thus, religious beliefs may well have the flexibility to influence many aspects of the coping process (i.e., appraisals, coping activities, outcomes, resources or constraints, and motivation) in a variety of ways and differently at different times. Intraindividual variability in religious beliefs might be involved in mediating both the effects of environmental events on individuals' coping styles and the impact that individuals' coping styles have on their context.

The accruing evidence suggests that it is incumbent on researchers to recognize sources of intraindividual variability explicitly in both their research designs and their accounts of behavior, behavioral development, and change. This includes being able to measure attributes of the individual with sufficient sensitivity to intraindividual variability. Without data from multiple occasions of measurement, one cannot say much about intraindividual variability. For that matter, however, one cannot say much about stability without repeated measurements.

Clearly, more systematic work is needed both to develop analytical models for representing intraindividual variability within psychological phenomena and to integrate the concepts into theoretical frameworks. Our findings of substantial and well-structured intraindividual variability self-reported in worldviews and religious beliefs only scratch the surface regarding the nature of more dynamic as opposed to static attributes of the individual. Our data suggest, however, that, in the pursuit of a better understanding of behavior, there are two general categories of variables that need to be more critically examined. The first includes what are generally regarded to be the more stable, traitlike dispositions of the living organism. Scores on these general dimensions may be reflecting something more than a static quality that changes slowly, if at all. They may also be indicative of consistent differences in how individuals vary over time. The second category of variable begging for closer scrutiny includes those that are known to exhibit short-term variability but are typically dismissed as essentially unreliable or noisy. Relying solely on what are assumed to be stable interindividual differences to characterize the nature of the functioning organism ignores potentially valuable, informative sources of a different kind of individual differences—those residing in patterns of intraindividual variability.

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Appendix

Items of the Worldviews and Religious Beliefs Questionnaire

1. When bad things happen, we are not supposed to know why. We are just supposed to accept them. (Not wonder why; NWW)
2. People die when it is their time to die, and nothing can change that. (Die when it's the time; DWT)
3. Everything that happens is a part of God's plan. (All plan of God; APG)
4. I have made many sacrifices to ensure a good future for myself (and my family). (Sacrificed for future; SFF)
5. If bad things happen, it is because they were meant to be. (Bad things meant to be; BMB)
6. By and large, people deserve what they get. (Deserve what you get; DWG)
7. People who meet with misfortune have often brought it on themselves. (Misfortune brought on; MBO)
8. In the long run good people will be rewarded for the good things they have done. (Good people rewarded; GPR)
9. Because I worked hard and sacrificed in the past, I am entitled to good things in my future. (Work hard good future; WGF)

Received July 31, 1995
Revision received January 22, 1996
Accepted January 22, 1996 ■