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Latent Growth Modeling of Subjective Well-Being

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111th Annual Convention of the American Psychological Association

August 7 – 10, 2003

Toronto, Ontario, Canada

ANALYSES OF STABILITY IN SUBJECTIVE WELL-BEING USING LATENT GROWTH CURVE MODELING

Personal appraisal of happiness becomes salient in forming the bases of one's mental health. Grounded in their own view of "good life," people identify the meaning of life and define their own well-being. Among all, psychological mechanisms that are thought of as responsible for evaluating one's quality of life have extensively been studied under subjective well-being (SWB) (Diener, Suh, Lucas, & Smith, 1999; Diener, 1984).

Central to SWB is a spectrum of one's emotional experience, categorized as the positive and negative affect, and the cognitive judgment of one's satisfaction with life (Andrews & Withey, 1976; Lucas, Diener, & Suh, 1996). Theory of SWB further states that the presence of positive affect and life satisfaction, along with the absence of negative affect, becomes the marker of the optimal SWB. A substantial body of evidence has documented the socio-psychological and demographic correlates of SWB (e.g., Diener & Fujita, 1995; Diener & Diener, 1995; Emmons & Diener, 1985).

Since SWB largely involves personal evaluation, the measurement usually entails the self-report emotional states and life satisfaction (e.g., Diener, Emmons, Larsen, & Griffin, 1985; Watson, Clark, & Tellegen, 1988). The importance of self-rated well-being was particularly highlighted by Diener (1984) who argued that SWB, by definition, can and should be assessed subjectively, as it may be independent of the views of others or a set of social indicators (e.g., SES) (Diener, 1984). A particular methodological concern included the measurement of the self-rated well-being crosssectionally (e.g., Diener, Suh, Lucas, & Smith, 1999). Because the level of SWB may not only be reflective of one's emotional state or life satisfaction at certain point in time (e.g., now or today) but also those over the course of life (e.g., a past month or year), the nature of SWB cannot be assessed adequately by employing the cross-sectional design. For example, two individuals might both report the high degree of SWB at certain point in time, yet one of them could happen to be high SWB at that time. As a result, research questions such as how stable, or changeable, is SWB cannot be answered without measuring it across multiple point in time.

The purpose of this study is to present the finding of the longitudinal study of SWB, in which each component of SWB (i.e., positive and negative affect and life satisfaction) was measured weekly across the period of one month. In particular, we sought to provide answers to the questions concerning the degree of change and stability in SWB by using the latent growth modeling (LGM).

Method

Participants and Procedures

Participants were volunteers who were recruited from a community college in Midwest. There were 221 students (Male: N = 81; Female: N = 140), with the mean age being 27.6 years (SD = 12.92). The participants completed the instruments at the end of class period for four consecutive weeks.

Measures

The State Form of Positive and Negative Affect Scale of the Comprehensive Personality and Affect Scale (COPAS: Lubin & Whitlock, 2002).

State COPAS is comprised of 79 adjectives that measure respondents' state positive and negative affect (i.e., "How You Feel Today") with a 5-point Likert scale, ranging from "Not at all" to "Very often." The positive affect scale consists of five subscales: Contentment (11 adjectives), Joy (5), Vigor (9), Love (7), and Excitement (5). The negative affect scale is comprised of five subscales: Depression (15 adjectives), Hostility (7), Anxiety (7), Agitation (7) and Social Anxiety (5).

The Brief Life Satisfaction Scale (BLSS; Lubin & Whitlock, in press) is comprised of 10 items that measure respondents' levels of life satisfactions across ten life domains (e.g., work, family, etc.) on a 5-point Likert scale, ranging from "very dissatisfied (1)" to "very satisfied (5)."

Model Specification

The present LGM consisted of 12 latent constructs: T_1 – T_4 (Time-Specific SWB); ReT_1 – ReT_4 (Residual Time-Specific Affect); L (Level); ReL (Residual Level); S (Slope); and ReS (Residual Slope); measured by 12 observed variables: NA_1 – NA_4; PA_1 – PA_4; and LS_1– LS_4 (see Figure 1).

Given the measurement invariance that is required in testing LGM, moreover, equality constraints were imposed on the followings: 1) factor loadings: $\lambda_{i1} = \lambda_{ij}$, e.g., $\lambda_{11}= \lambda_{12} = \lambda_{13} = \lambda_{14}$; 2) intercepts: $I(NA_1) = I(NA_i)$, $I(PA_1) = I(PA_i)$, and $I(LS_1) = I(LS_i)$, e.g., $I(NA_1) = I(NA_2) = I(NA_3) = I(NA_4)$; and 3) unique variances: $V(\varepsilon_{i1}) = V(\varepsilon_{ij})$, e.g., $V(\varepsilon_{11}) = V(\varepsilon_{12}) = V(\varepsilon_{13})$. This formulation is equivalent to the strict invariance model as described by Meredith (1994). The model was identified by setting a series of the residual time-specific affect means as zero: $M(ReT_1) = M(ReT_2) = M(ReT_3) = M(ReT_4) = 0$; the residual time-specific variance T_1 as one: $V(ReT_1) = 1$; and a set of the intercepts, $I(LS_1)$ – $I(LS_4)$, as zero: $I(LS_1) = I(LS_2) = I(LS_3) = I(LS_4) = 0$.

Results

Table 1 showed inter-correlations of the components of SWB, along with the means and standard deviations. The LGM presented by Figure 1 was tested with the maximum likelihood estimation procedure using the Amos 4 computer program (Arbuckle, 1999). The model had an overall good fit {χ^2 (45, N = 221) = 148.58, p < .01; the comparative fit index (CFI) = .99; the normed fit index (NFI) = .99; the non-normed fit index (NNFI) = .99; and the root mean squared error of approximation (RMSEA) = .09}.

In particular, examination of the directions of the factor loadings revealed that positive affect and life satisfaction were positively related, while negative affect was negatively related, with the time-specific SWB factor measured across time, where the magnitude of the loadings range from .41 to .64 (see Table 2). Estimated mean of the level factor was found to be statistically significant. On the other hand, non-significant estimated variance of the level factor suggested that the variability of SWB did not differ initially across individuals (see Table 3). Furthermore, neither the estimated mean nor variance of the slope factor was statistically significant, which suggested that there was no intra-individual change in SWB across time. Low and non-significant correlation (r = .31; p > .05) between the level and slope factors also indicated the rate of change in SWB did not differ across individuals depending the initial levels of their SWB.

Conclusions

The present study examined the nature of SWB using LGM. The appropriate model fit for the strict invariance (Meredith, 1993) specified in the present model revealed that the mean and covariance structure underlying the SWB latent factor remain unchanged across weeks. The patterns of relationship of the SWB factor with positive and negative affect and life satisfaction were also consistent with the previous literature (e.g., Diener et al, 1999), such that positive affect and life satisfaction were positive indicators of SWB, while negative affect was a negative indicator.

More importantly, non-significant estimated mean and variance of the slope indicated no change, or growth trend, in SWB across a period of one month. Thus, one's personal appraisal of well-being could have best been characterized a psychological trait that has a high degree of stability.

The present results reported here used the model that was characterized by the strict invariance, imposing equality constraints on the unique variance as well as the factor loadings and intercepts. Given the adequate model fit, the findings may be generalized to other time and/or occasions. Moreover, no statistically significant and substantial changes were observed in the state component of SWB. This means that intraindividual variability in SWB, as measured by State COPAS, can be thought of as stable psychological phenomena rather than fluctuate in a systematic manner.

Table 1. Correlations Between Positive Affect Scales Across Time

	Time 1			Time 2			Time 3			Time 4		
Scales	LS	PA	NA	LS	PA	NA	LS	PA	NA	LS	PA	NA
Time 1												
LS	(.82)											
PA	.38	(.93)										
NA	-.44	-.13	(.95)									
Time 2												
LS	.77	.37	-.38	(.87)								
PA	.34	.64	.03	.41	(.96)							
NA	-.36	.01	.55	-.40	-.23	(.95)						
Time 3												
LS	.69	.30	-.39	.83	.27	-.32	(.87)					
PA	.37	.63	-.08	.40	.69	-.08	.47	(.96)				
NA	-.31	.03	.59	-.32	-.00	.66	-.45	-.18	(.97)			
Time 4												
LS	.65	.33	-.32	.83	.34	-.29	.82	.38	-.27	(.89)		
PA	.30	.68	-.04	.36	.69	-.02	.35	.74	.02	.45	(.97)	
NA	-.28	-.04	.49	-.31	-.03	.55	-.30	-.05	.55	-.35	-.21	(.97)
Mean	38.86	95.46	71.64	38.92	95.60	70.77	38.86	94.67	70.39	38.78	95.55	69.08
SD	5.63	19.84	21.41	6.25	21.73	21.14	6.76	22.27	24.39	6.69	22.25	22.87

Table 2. Mean and Variance Estimates of the Levels and Slopes in Four Models.

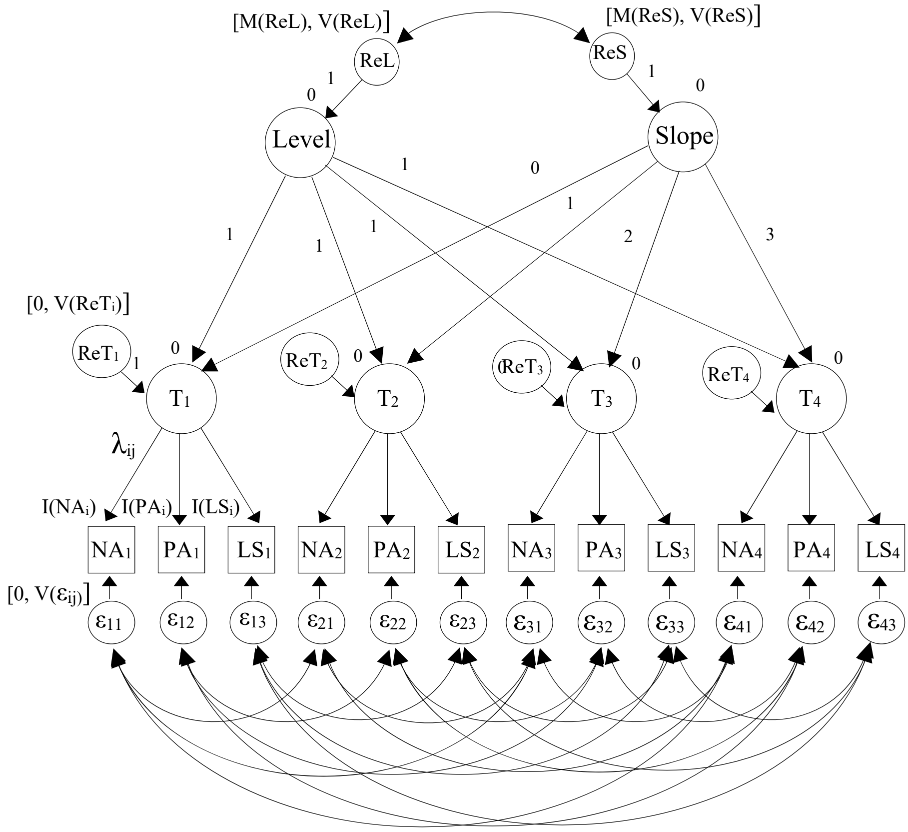
Variable	Mean	Variance
Level	32.21*	2.72
	(7.99)	(1.74)
Slope	.03	.006
	(.006)	(.12)

Note. Standard errors are given in parentheses. * $p < .01$.

Table 3. Summary of Unstandardized Parameter Estimates.

Factor Loadings		Intercepts		Unique Variance	
λ_{11} [$T_1 \rightarrow NA_1$]	- 6.11 (-.54)	I(NA_1)	267.47	V(ε_{11})	336.96
λ_{21} [$T_2 \rightarrow NA_2$]	- 6.11 (-.59)	I(NA_2)	267.47	V(ε_{21})	336.96
λ_{31} [$T_3 \rightarrow NA_3$]	- 6.11 (-.64)	I(NA_3)	267.47	V(ε_{31})	336.96
λ_{41} [$T_3 \rightarrow NA_3$]	- 6.11 (-.64)	I(NA_4)	267.47	V(ε_{41})	336.96
λ_{12} [$T_1 \rightarrow PA_1$]	5.44 (.50)	I(NA_1)	- 80.01	V(ε_{12})	332.20
λ_{22} [$T_2 \rightarrow PA_2$]	5.44 (.55)	I(PA_2)	- 80.01	V(ε_{22})	332.20
λ_{32} [$T_3 \rightarrow PA_3$]	5.44 (.60)	I(PA_3)	- 80.01	V(ε_{32})	332.20
λ_{42} [$T_4 \rightarrow PA_4$]	5.44 (.59)	I(PA_4)	- 80.01	V(ε_{42})	332.20
λ_{13} [$T_1 \rightarrow LS_1$]	1.20 (.41)	I(LS_1)	0.00	V(ε_{13})	26.58
λ_{23} [$T_3 \rightarrow LS_3$]	1.20 (.46)	I(LS_2)	0.00	V(ε_{23})	26.58
λ_{33} [$T_3 \rightarrow LS_3$]	1.20 (.50)	I(LS_3)	0.00	V(ε_{33})	26.58
λ_{43} [$T_1 \rightarrow LS_1$]	1.20 (.50)	I(LS_4)	0.00	V(ε_{43})	26.58

Note: Numbers in prentices are standardized regression coefficients. All parameter estimates were statistically significant (*p*s < .01)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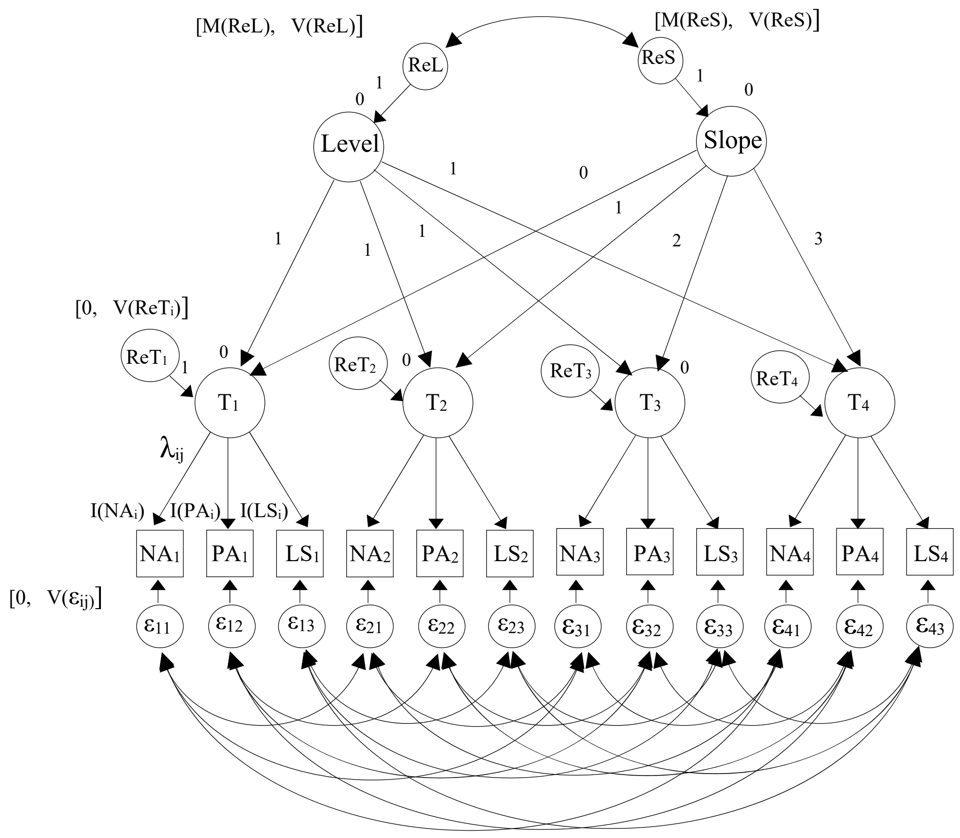

Figure 1. Latent Growth Model. 1) L: Level; 2) ReL: Residual Level; 3) M(ReL): Residual Level Mean; 4) V(ReL): Residual Level Variance; 5) S: Slope; 6) ReS: Residual Slope; 7) M(ReS): Residual Slope Mean; 8) V(ReS): Residual Slope Variance; 9) $T_1 - T_4$: Time-Specific SWB; 10) ReT_i: Residual Time-Specific SWB (i = 1-4); 11) V(ReT_i): Residual Time-Specific SWB Variance (i = 1-4); 12) $NA_1 - NA_4$: Negagtive Affect Observed Scores; 13) $PA_1 - PA_4$: Positive Affect Observed Scores; 14) $LS_1 - LS_4$: Life Satisfaction Observed Scores; 15) λ_{ij}: Factor Loadings (i = 1-4; j = 1-3); 16) I(NA_j): Negative Affect Intercept; 17) I(PA_1): Positive Affect Intercept; 18) I(LS_1): Life Satisfaction Intercept; 19) $\varepsilon_{11} - \varepsilon_{43}$: Unique Factors; 20)V($\varepsilon_{ij}$): Unique Variances (i = 1-4; j = 1-3).