

BRIEF REPORTS

Keyes's Model of Mental Health With Personal Growth Initiative as a Parsimonious Predictor

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This research addressed issues at the heart of counseling psychology: operationalizing mental health and identifying parsimonious ways of predicting levels of mental health. The primary purpose of the study was to investigate the replicability of the structure of C. L. M. Keyes's (2002) model of mental health in 2 samples of college students (total $N = 244$ women and 223 men). Results of confirmatory factor analyses supported this 3-factor model of psychological, social, and emotional well-being, consisting of 14 subdimensions. Furthermore, this model was found to be invariant for men and women in both samples. The secondary purpose was to assess the effectiveness of personal growth initiative (PGI; C. Robitschek, 1998) as a parsimonious predictor (i.e., 1 predictor for many outcomes) of these multiple dimensions of mental health. Results of structural equation modeling supported PGI as a parsimonious predictor of Keyes's multidimensional mental health model for men and women in both groups. Limitations are discussed, and implications for research and practice in counseling psychology are presented.

Keywords: mental health, flourishing, personal growth initiative, subjective well-being

Throughout its history, counseling psychology has had a “focus on people's assets and strengths, and on positive mental health” (Gelso & Fretz, 2001, p. 6). Yet, finding a commonly accepted operational definition of “mental health”—that is, as more than the absence of psychopathology—has been challenging. Many proposed definitions have included aspects of psychological, social, or emotional well-being (e.g., Adler, 1979; Erikson, 1959), with most definitions pointing to a multidimensional construct. Counseling psychology needs a model of multidimensional mental health that is theoretically grounded with dimensions that are psychometrically distinct. Keyes (2002, 2007) proposed one such multidimensional model of mental health.

In addition, it will be helpful if counselors and researchers discover factors to promote multidimensional mental health. Will there be specificity of interventions for various aspects of mental health, similar to empirically supported treatments for specific types of disorders (e.g., Chambless & Ollendick, 2001)? Or might there be interventions that will be parsimonious across multiple aspects of mental health? A *parsimonious* intervention is “econom[ical] in the use of means to an end” (accessed July 11, 2008, from <http://www.merriam-webster.com/dictionary/parsimony>); for example, a single intervention may positively impact multiple aspects of mental health, similar to a common factors approach to mental disorders (e.g., Wampold, 2001).

The current study had two purposes. First, the psychometric structure of Keyes's multidimensional model of mental health has not been tested in a college student sample. We investigated the replicability of the factor structure found in other populations. Second, although this study did not test a parsimonious *intervention*, personal growth initiative (PGI; Robitschek, 1998) was tested as a potential *parsimonious predictor* of this multidimensional model of mental health. This is an important area of study because a growing body of research shows that college students experience relatively high levels of mental disorders, including eating disorders (Steiger & Séguin, 1999), anxiety (Chandler & Gallagher, 1996), and depression (Rosenthal & Schreiner, 2000). The results of this study could provide preliminary data to support research exploring increasing PGI as a possible parsimonious intervention to enhance multidimensional mental health in college students. These types of preventive interventions may serve as a protective factor against the onset of mental disorders among college students. These interventions also may enhance the quality of life for college students currently experiencing mental disorders by improving their mental health. The research in the current study, however, must be conducted first, to determine whether the relations exist among the constructs, that is, whether college students with higher levels of PGI also have higher levels of mental health.

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Multidimensional Mental Health

Keyes's (2002) model of mental health includes three domains: emotional, psychological, and social well-being. Emotional well-being is comprised of avowed quality of life (*viz.*, satisfaction and happiness with life) and positive affect. Psychological well-being is the extent to which people are thriving in their personal lives, for example, self-acceptance and a sense of purpose in life (Ryff,

1989). Social well-being is the extent to which people are thriving in their social lives, in local and broader communities (Keyes, 1998).

This model of mental health was derived from theory, factor analysis, and rational criteria. Evidence for the validity of each domain in Keyes's model of mental health—emotional, psychological, and social—initially was obtained separately (Keyes, 1998; Ryff, 1989; Ryff & Keyes, 1995). The independence of these three domains (i.e., factors) has been tested and supported. Independent national samples have included adolescents (Keyes, 2005) and adults aged 25–74 (Keyes, Shmotkin, & Ryff, 2002; Ryff & Keyes, 1995). Various lengths of the standard mental health questionnaires (see the Method section for additional information) have been used, ranging from single-item scales and subscales (Keyes, 2005; Keyes et al., 2008) to full-length versions (Ryff, 1989). Both exploratory (Keyes, 1996) and confirmatory (Keyes, 2005) factor analyses provided evidence to support the tripartite factor structure. The current study presents the first test of Keyes's model in college students.

Using these multiple domains and dimensions of mental health, Keyes (2002, 2005) conceptualized a mental health continuum that can be measured either categorically through a diagnosis (i.e., flourishing, moderately mentally healthy, or languishing) or continuously as a summary measure. The continuous assessment method, used in the current study, simply sums all subscales of mental health together to form a composite index. Results of several studies revealed the same outcomes and conclusions whether the experimenters used the categorical or continuous methods. Specifically, missed days of work, cutbacks in the amount of work, limitations of activities of daily living, prevalence of cardiovascular disease, average number of chronic physical health conditions, and poor psychosocial functioning are lowest among flourishing individuals and highest among languishing individuals (Keyes, 2007).

This research suggests two conclusions. First, these outcomes encompass vocational, physical health, and psychosocial realms, which suggests that the breadth of impact for an individual's level of multidimensional mental health may be far reaching. This mental health model could provide university counseling psychologists and other mental health professionals with a new tool for better understanding individual clients and for conducting much-needed research on positive human functioning. Second, it is possible that both the categorical and continuous methods of measuring mental health may be equally valid. As suggested by Keyes (2007), the continuous measurement method is similar to the Global Assessment of Functioning (GAF) approach in the *Diagnostic and Statistical Manual of Mental Disorders* (4th ed., text rev.; American Psychiatric Association, 2000). An advantage is that it increases the possible variance of scores, which increases the likelihood of detecting relations of multidimensional mental health with other variables.

PGI

Outside of Keyes's (1996) doctoral thesis, there have been few direct tests of conditions that facilitate good mental health as operationalized in this model. More specifically, there is a need to understand how to promote multidimensional mental health in parsimonious ways. Teaching people the skills they need to grow

throughout their lives as a means of acquiring and maintaining mental health has been a core feature of many therapies, including humanistic (e.g., Rogers, 1961) and cognitive (e.g., Beck, 1963; Linehan, 1993). PGI is defined as intentional involvement in changing and developing as a person (Robitschek, 1998). It includes cognitive components, such as knowing how to change and believing that change is possible, and behavioral components, such as taking the initiative to actually enact the change process. The defining feature of PGI is that the self-change process is intentional (Robitschek, 1999). Theoretically, higher levels of PGI should promote greater well-being because a higher level reflects the essence of eudemonic well-being, that is, feelings expressed when one engages in behaviors aimed at reaching one's potential (Ryff, 1989). Furthermore, when individuals pursue goals that reflect intrinsic motivations aimed at personal growth, they tend to report higher levels of subjective well-being than when they pursue goals with extrinsic motives, such as financial success or improvement of one's popularity (e.g., Deci & Ryan, 1985).

PGI has been consistently positively related to psychological well-being (Robitschek, 1998; Robitschek & Kashubeck, 1999) and emotional well-being (Robitschek & Kashubeck, 1999). No studies, however, have examined the relations of PGI with social well-being or Keyes's complete model of mental health, regardless of the population. The current study addressed these gaps by (a) operationalizing mental health across all 14 dimensions of Keyes's model of mental health; (b) assessing relations of PGI with the three major domains of Keyes's model (i.e., psychological, social, and emotional well-being) in two samples of college students; and (c) using confirmatory factor analysis (CFA) and structural equation modeling, which take into account the expected low estimates of internal consistency in the measures of psychological and social well-being, as was found in prior research (e.g., Keyes, 1998; Ryff & Keyes, 1995).

Research Hypotheses

We hypothesized that Keyes's three-factor model of mental health, found and confirmed in prior research, would be confirmed by the data (Hypothesis 1). Second, we hypothesized that PGI would predict levels of emotional, psychological, and social well-being (Hypothesis 2). College students were sampled because of their pressing mental health needs and so we could begin to fill this age gap in the existing literature. Because Keyes's model of mental health has not been assessed by gender in previous research, it seems prudent to explore the possibility of gender differences in the model and among factors that may predict the model rather than to assume that all will be identical across genders. Therefore, the current study is the first to explore possible gender differences in Keyes's model of mental health and a possible predictor of the factors of mental health. Exploratory analyses were conducted to determine whether the factor structure of this model of mental health was invariant between women and men (Research Question 1 [RQ1]) and whether the extent to which PGI predicted the domains of mental health would be the same for men and women (RQ2). Prior research has found that the relations of PGI with aspects of mental health have been meaningfully different (e.g., PGI accounted for 49% of the variance in a measure of psychological well-being for women and for only 26% of the variance for men; Robitschek, 1999).

Method

Participants

The initial sample size was 533. Data from Hispanic participants ($n = 65$) were removed from the data set because of equivocal results regarding the factor structure of the Personal Growth Initiative Scale (PGIS; Robitschek, 1998) with this group (Robitschek, 2003). Data from 1 additional participant were dropped because ethnicity was not reported. The final sample of participants consisted of 244 women and 223 men enrolled in introductory psychology classes at a large Southwestern university who received course credit for participation. Participants self-identified as White, non-Hispanic ($n = 410$), African American ($n = 22$), biracial ($n = 16$), Asian American ($n = 9$), American Indian ($n = 5$), and other ($n = 5$). Average age was 19.67 years ($SD = 1.71$). Approximately half of the participants reported being 1st-year students (49.7%), with relatively even distributions of students in other years of their education. The sample was similar to freshmen at this university in terms of ethnic diversity and gender. Average age of the sample was approximately 1 year older than the mean for all freshmen. Approximately half of the sample reported they were dating (48.6%). Slightly less reported they were single (42.2%). The majority of students self-reported their socioeconomic status as middle class (45.0%) or upper-middle class (37.0%). Data on relationship and socioeconomic status of freshmen at the university were not available for comparison with the sample.

Instruments

Measures of well-being replicated scales used in the MacArthur Foundation's national study on Successful Midlife Development (the Midlife Development in the United States Survey; Keyes, 2002; Ryff & Keyes, 1995). The only measurement modification made for this study was in the response options for the Scales of Psychological Well-being (Ryff, 1989; detailed below).

Emotional well-being. Measures included single-item measures of avowed satisfaction with life overall and avowed happiness with life overall. The avowed items are an adaptation of Cantril's (1967) Self-Anchoring Scale that asks respondents, for example, "How satisfied are you with the way things are going for you these days?" on a scale from 0 (*very dissatisfied*) to 9 (*very satisfied*). Variants of Cantril's measure have been used in numerous studies worldwide, usually providing satisfactory psychometric properties (Andrews & Robinson, 1991). Emotional well-being also was measured with a six-item scale of positive affect. Respondents indicated how much of the time during the past 30 days they felt each type of positive affect on a scale from 0 (*all*) to 4 (*none of the time*). Items were recoded in the positive direction for ease of interpretation, and the average item score was calculated. This measure is based, in part, on Bradburn's (1969) affect balance scale, and estimates of internal consistency reliability in past studies have been high ($>.90$; e.g., Keyes, Shmotkin, & Ryff, 2002). The estimate of internal consistency in the current study was .83. It was not meaningful to calculate estimates of internal consistency for the single-item life-satisfaction and happiness measures. In a sample of 67 college students, small, nonsignificant correlations of the emotional well-being dimensions and social

desirability provided evidence for discriminant validity (Robitschek & Keyes, 2006).

Psychological well-being. Ryff's (1989) measure of psychological well-being consists of six subscales: Self-Acceptance, Positive Relations With Others, Personal Growth, Purpose in Life, Environmental Mastery, and Autonomy. The short-form, 3-item subscales were used, for a total of 18 items. Each item is rated on a 6-point Likert scale ranging from 1 (*strongly agree*) to 6 (*strongly disagree*). Because of a typographical error, the response scale in the current study was 0 (*strongly agree*) to 6 (*strongly disagree*), with a middle response option of 3 (*Don't know*) added. Thus, comparisons to scores from other samples are not possible. Some items are reverse-coded prior to averaging item responses for each subscale. Higher scores indicate a higher level of well-being. The 3 items for the short-form assessments were chosen to represent the subdimensions of the long-form subscales. Low estimates of internal consistency in early research stemmed from the decision to choose items that maximized content validity rather than internal consistency (Ryff & Keyes, 1995). Despite these low estimates, the short-form subscales provided support for the proposed theoretical structure of psychological well-being (see Ryff & Keyes, 1995). Consistent with this prior investigation, the 3-item scales in the current study exhibited poor estimates of internal consistency, .44 to .62. Small, nonsignificant correlations of the 3-item subscales with social desirability provided evidence of discriminant validity (Robitschek & Keyes, 2006).

Social well-being. Keyes's (1998) measure of social well-being consists of five subscales: Social Acceptance is a favorable view of human nature and a feeling of comfort with other people; Social Actualization is the belief in the evolution of society and the sense that society has potential that is being realized through its institutions and citizens; Social Contribution is the evaluation of one's value to society; Social Coherence is the perception of the quality, organization, and operation of the social world and includes a concern for knowing about the world; and Social Integration is the extent to which people feel they have something in common with others who constitute their social reality (e.g., their neighborhood), as well as the degree to which they feel that they belong to their communities and society. The three-item subscales were used in this study. Each subscale has a relative balance of positive and negative items, rated on a scale from 0 (*strongly agree*) to 6 (*strongly disagree*). Some items are reverse-coded, and then items are averaged together, with higher scores indicating higher levels of well-being.

Both the short and long form have supported the proposed five-factor structure of this instrument (Keyes, 1998). Evidence for convergent validity was provided by significant positive relations of civic engagement and prosocial behavior with overall social well-being (Keyes & Ryff, 1998). In a college student sample, the correlation between social desirability and social acceptance was moderate and significant ($r = .33, p = .007$). However, all other correlations of the subscales with social desirability were small and nonsignificant, providing partial evidence of discriminant validity (Robitschek & Keyes, 2006). Estimates of internal consistency for the subscales in the current sample ranged from .37 to .73.

PGI. The PGIS (Robitschek, 1998, 1999) consists of nine items rated on a 6-point Likert scale ranging from 0 (*definitely disagree*) to 5 (*definitely agree*). Scores are calculated by summing the responses to each item, with total scores ranging from 0 to 45.

Higher scores indicate higher levels of PGI. Robitschek (1998, 1999) reported test-retest reliability of .74 for 8 weeks and internal consistency estimates ranging from .78 to .88 in predominantly European American college student samples. Cronbach's alpha for the present sample was .86. A single-factor structure was supported in a predominantly European American college student sample (Robitschek, 1998). Robitschek (1998, 1999) provided evidence of validity. Evidence for validity includes small, nonsignificant correlations of the PGIS with age and social desirability; significant, moderate positive correlations ($r = .24-.56$) with internal locus of control, instrumentality, and growth that is in awareness and intentional; and significant, moderate negative correlations ($r = -.24$ to $-.54$) with chance locus of control and personal growth that is in awareness yet not intentional. (Readers can access the PGIS at <http://www.ppc.sas.upenn.edu/ppquestionnaires.htm>.)

Analyses

We divided participants into two groups (Group A and Group B) using a stratified (by gender) random sampling procedure. Sample sizes were 112 and 111 men for Groups A and B, respectively, and 122 women for each group. Hypotheses were tested for each group to provide two tests of Keyes's model of mental health, with PGI as a parsimonious predictor of this model. To test the first hypothesis, that Keyes's three-factor model of mental health would be confirmed in college samples, we used CFAs, as recommended by Tracey and Glidden-Tracey (1999), testing for multigroup (i.e., gender) invariance. In each analysis, two competing models were compared: a single-factor model, in which the 13 dimensions of mental health were part of a single factor, and a three-factor model, in which the dimensions of mental health were considered to be part of three intercorrelated domains of mental health. The three-factor model replicated Keyes's theory and the results of prior research.

Structural equation modeling, again testing for multigroup (i.e., gender) invariance, was used to test the second hypothesis regarding the prediction of emotional, psychological, and social well-being by PGI. EQS for Windows, Version 6.1, was used for all primary analyses. In all analyses, the same factor loading of one indicator for each mental health domain was fixed to 1.00 to set the metric for that factor. In the structural equation modeling analysis, the PGI latent construct was operationalized with all nine items as indicators. This follows procedures suggested by Marsh, Hau, Balla, and Grayson (1998), who conducted Monte Carlo simulations of CFAs. They found that regardless of sample size, increasing the number of indicators per factor improved the solution of the CFA. The worst solutions had multi-item parcels, and the best solutions had individual items as indicators of a factor.

To assess fit of the models, the following fit indices were used: chi-square-based statistics, comparative fit index, standardized root mean squared residual, and the root mean square error of approximation. Ideally, chi-square will not be significant. Because of its greater sensitivity to sample size than that of other fit indices (Kline, 1998), an additional chi-square-based statistic was used; $\chi^2/df < 3.0$ is considered adequate (Kline, 1998). Values for comparative fit index that are $>.90$ are thought to be adequate, and those that are $>.95$ are considered good. Standardized root mean squared residual values $<.10$ are considered acceptable (Kline,

1998). Values of root mean square error of approximation in a range of .08-.10 indicate mediocre fit (MacCallum, Browne, & Sugawara, 1996); values $<.08$ are considered adequate, and those that are $<.05$ are considered good (Browne & Cudeck, 1993).

Results

Means, standard deviations, and bivariate correlations for all variables for the total sample, separate for women and men, are shown in Table 1. (Tables of descriptive statistics and bivariate correlations separated for Groups A and B, by gender, are available from Christine Robitschek.) Results for Groups A and B were similar for all analyses. Thus, results for both groups are described concurrently.

Hypothesis 1 and RQ1 stated that the three-factor model of mental health would be supported and the model would be invariant for men and women. Multigroup CFA tested this. The estimation method was maximum likelihood with robust methods, due to moderate multivariate kurtosis. Two types of models were tested: a single-factor model, in which all factor loadings were for a single factor, and a three-factor model, in which factors corresponded to the three domains of mental health, and these were allowed to covary. To test the single-factor model, two models were assessed. Model 1 constrained all factor loadings to be equal for men and women. Model 2 was identical to Model 1 except that it had no multigroup constraints. Fit indices for Models 1 and 2 are shown in Table 2. Neither model provided adequate fit for the data for either group.

The three-factor model, which allowed the three domains of mental health to covary, was tested next. Model 3 constrained all path coefficients and covariances to be equal for women and men. Model 4 had no multigroup constraints. For the men in Group B, the variance of the error term for happiness was constrained to equal .001 because the actual variance of the error term approached zero. Substituting a small, fixed value is an acceptable alternative in this situation (Byrne, 1994). This modification was repeated for all subsequent analyses involving Group B men; this accounts for the increase in 1 degree of freedom for Group B analyses for Models 3 and beyond. Fit indices for Models 3 and 4 are shown in Table 2. For Groups A and B, both models provided adequate fit for the data, with significant values for all tested path coefficients and covariances. The scaled chi-square difference tests (Satorra & Bentler, 2001) were not significant. This indicated that the simpler model, that is Model 3, in which the path coefficients and covariances are constrained to be equal for women and men, fit the data just as well as Model 4, and therefore was the preferred model.

The three-factor model then was compared with the single-factor model to determine which model fit the data better. Given the preceding results, the models with the multigroup constraints (i.e., Models 1 and 3) were used in this analysis. For Groups A and B, the three-factor model was the better fitting model (see Table 2). Standardized factor loadings for the three-factor model ranged from .36 to 1.00. Standardized covariances ranged from .54 to .86. (Additional information about estimated parameters for each group and gender are available from Christine Robitschek.)

The second hypothesis and second research question stated that PGI would predict levels of the domains of mental health, and this model would be invariant for men and women. In preparation for

Table 1
 Descriptive Statistics, Estimates of Internal Consistency, and Bivariate Correlations for Women ($N = 244$) and Men ($N = 223$)

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
1. PGI		.41***	.35***	.42***	.30***	.33***	.42***	.11	.17	.40***	.35***	.28***	.37***	.36***	.36***	
2. Self-acceptance	.41***		.37***	.45***	.56***	.30***	.33***	.20	.34***	.39***	.31***	.42***	.55***	.49***	.44***	
3. Purpose in life [†]	.39***	.39***		.26***	.30***	.33***	.27***	.08	.19	.29***	.27***	.17	.28***	.28***	.24***	
4. Env. mastery	.46***	.54***	.37***		.43***	.28***	.33***	.28***	.21	.32***	.28***	.34***	.60***	.47***	.48***	
5. Pos rel. w/others [†]	.32***	.40***	.25***	.28***		.29***	.14	.30***	.28***	.37***	.23	.45***	.47***	.41***	.42***	
6. Personal growth	.38***	.42***	.43***	.42***	.29***		.38***	.11	.24***	.36***	.42***	.26***	.23***	.15	.15	
7. Autonomy	.28***	.38***	.24***	.30***	.11	.26***		.17	.09	.28***	.37***	.14	.22***	.18	.15	
8. Soc. acceptance [†]	.14	.24***	.14	.20	.29***	.13	.00		.40***	.31***	.17	.36***	.26***	.15	.17	
9. Soc. actualization	.26***	.26***	.27***	.26***	.29***	.32***	.11	.42***		.24***	.28***	.39***	.28***	.18	.17	
10. Soc. contribution [†]	.31***	.35***	.23	.25***	.37***	.31***	.17	.26***	.31***		.44***	.36***	.33***	.30***	.27***	
11. Soc. coherence [‡]	.36***	.23***	.30***	.35***	.24***	.38***	.24***	.05	.23	.35***		.34***	.33***	.23***	.19	
12. Soc. integration [†]	.28***	.34***	.12	.22***	.44***	.23***	.10	.35***	.39***	.50***	.21		.44***	.33***	.34***	
13. Positive affect	.38***	.37***	.19	.37***	.32***	.29***	.17	.26***	.30***	.28***	.19***	.34***		.70***	.72***	
14. Life satisfaction	.40***	.44***	.36***	.45***	.29***	.35***	.23***	.29***	.38***	.28***	.34***	.27***	.59***		.86***	
15. Happiness	.41***	.50***	.32***	.44***	.38***	.40***	.19	.36***	.42***	.34***	.29***	.35***	.66***	.88***		
Internal consistency	.86	.62	.44	.46	.57	.56	.61	.37	.55	.64	.51	.73	.83			
Women																
<i>M</i>	31.96	4.84	4.97	4.10	4.78	5.35	4.42	3.61	3.89	4.70	3.94	4.20	2.33	6.42	6.46	
<i>SD</i>	7.06	1.06	0.93	1.08	1.17	0.76	1.10	1.10	1.17	0.99	1.13	1.35	0.68	1.96	2.02	
Men																
<i>M</i>	31.71	4.77	4.53	4.06	4.20	5.17	4.54	3.25	3.67	4.36	4.35	3.77	2.29	6.35	6.33	
<i>SD</i>	7.11	1.12	1.07	1.13	1.25	0.83	1.08	1.09	1.28	1.15	1.09	1.35	0.68	1.89	1.80	

Note. Correlations above the diagonal are for women; correlations below the diagonal are for men. PGI = Personal growth initiative; Env. mastery = Environmental mastery; Pos rel. w/others = Positive relations with others; Soc. = Social (well-being dimensions).
 *** $p < .000$. [†] $p < .003$, with the mean for women higher than the mean for men. [‡] $p < .003$, with the mean for men higher than the mean for women.

testing this hypothesis, the personal growth subscale was removed from the psychological well-being domain, because of conceptual overlap with PGI. Then Keyes's three-factor model of mental health was retested for model fit and model invariance for women and men. Model 5 included constraints on path coefficients and covariances across men's and women's models. Model 6 did not include these constraints. Fit indices are shown in Table 2. For Groups A and B, both models provided adequate fit for the data, with significant values for all tested path coefficients and covariances. Again the chi-square difference tests were not significant, indicating that Model 5 (with constraints) was the preferred model.

Additional preliminary analyses were conducted to determine whether PGI is a distinct construct from each of the three domains of mental health. Pairs of CFAs were conducted—a one-factor model in which PGI items and well-being items from one domain all loaded on the same factor, and a two-factor model in which each set of items loaded only on their respective factors and the factors were free to covary. This was repeated for PGI with each of the dimensions of well-being. In all cases, the one-factor models did not fit the data well. In all but two cases, the two-factor models fit the data at least adequately. For men in Group B, the two-factor models for PGI with social well-being and with psychological well-being did not fit the data well. In sum, for four of six paired comparisons, the two-factor models fit the data better than did the

one-factor models, providing evidence that PGI is distinct from these domains of mental health.

Hypothesis 2 and RQ2 were tested with structural equation modeling, beginning with tests of the measurement model. Four latent constructs, nine PGI items, five subscales of psychological well-being, five subscales of social well-being, and three measures of emotional well-being were included in the measurement model. In the first measurement model, Model 7, all estimated path coefficients and covariances were constrained to be equal across groups. Model 8 had no constraints. Table 2 shows that for Groups A and B, both models fit the data adequately; all except one estimated path coefficient and covariance were significant in both models, as well. In Sample B, Model 7, the error variance for Life Satisfaction was not significant for women. The scaled chi-square difference tests were not significant, indicating that Model 7 was the better model for both groups. Factor loadings for Model 7 are shown in Table 3.

Model 9 tested the structural model and included constraints across groups for all estimated path coefficients and covariances. Model 10 removed the constraints. As shown in Table 2, both models provided adequate fit for the data, and the vast majority of estimated parameters were found to be significant. One to three error or disturbance variances were nonsignificant in each model. Model 9, with the multigroup constraints, was the better fitting

Table 2

Summary of Fit Indices for Confirmatory Factor Analyses (CFAs) and Structural Equation Models (SEMs) for Group A and Group B

Model or comparison of models	SB χ^2	df	χ^2/df	CFI	SRMR ^a	RMSEA	Scaled ^b $\Delta\chi^2$
Hypothesis 1							
1. Single factor CFA w/ constraints							
Group A	442.98**	167	2.65	.74	.11	.12	
Group B	403.76**	167	2.42	.76	.12	.11	
2. Single factor CFA w/out constraints							
Group A	424.18**	154	2.75	.74	.10	.12	
Group B	394.06**	154	2.56	.75	.11	.12	
3. 3-factor CFA w/ constraints							
Group A	241.08**	162	1.49	.93	.09	.07	
Group B	228.93**	163	1.40	1.00	.09	.06	
4. 3-factor CFA w/out constraints							
Group A	227.89**	148	1.53	.92	.08	.07	
Group B	212.61**	149	1.43	1.00	.08	.06	
Model 3 vs. Model 4							
Group A		14					12.32 [§]
Group B		14					16.38 [§]
Model 3 vs. Model 1							
Group A		5					131.32**
Group B		5					155.95**
Hypothesis 2							
5. 3-factor CFA w/out Ryff's personal growth, w/ constraints							
Group A	195.87**	137	1.43	.94	.08	.06	
Group B	199.20**	138	1.41	1.00	.09	.06	
6. 3-factor CFA w/out Ryff's personal growth, w/out constraints							
Group A	184.01**	124	1.48	.94	.07	.07	
Group B	178.30**	125	1.43	1.00	.08	.06	
Model 5 vs. Model 6							
Group A		13					10.52 [§]
Group B		13					15.93 [§]
7. Measurement model w/ constraints							
Group A	537.39**	430	1.25	.94	.08	.05	
Group B	642.26**	431	1.49	1.00	.10	.07	
8. Measurement model w/out constraints							
Group A	516.77**	406	1.27	.93	.07	.05	
Group B	617.59**	407	1.52	1.00	.10	.07	
Model 7 vs. Model 8							
Group A		24					18.58 [§]
Group B		24					24.75 [§]
9. SEM model with constraints							
Group A	535.86**	430	1.25	.94	.08	.05	
Group B	642.24**	431	1.49	1.00	.10	.07	
10. SEM model w/out constraints							
Group A	516.77**	406	1.27	.93	.07	.05	
Group B	617.53**	407	1.52	1.00	.10	.07	
Model 9 vs. Model 10							
Group A		24					16.86 [§]
Group B		24					24.79 [§]

Note. SB = Satorra-Bentler; CFI = comparative fit index; SRMR = standardized root mean squared residual; RMSEA = root mean square error of approximation; w/ = with; w/out = without.

^a SRMR is not available as a robust statistic. ^b When calculating $\Delta\chi^2$ for SB χ^2 , $\Delta\chi^2$ must be scaled because simple $\Delta\chi^2$ is not distributed as χ^2 (Satorra Bentler, 2001).

** $p < .001$. [§] $p > .05$.

model for Groups A and B. Path coefficients and covariances for Model 9 are shown in Figure 1. In Model 9, while accounting for covariance among the mental health domains, the PGI latent factor accounted for significant variance in each of these domains. Unique R^2 was .38 to .55 for psychological well-being, .25 to .27 for social well-being, and .18 to .21 for emotional well-being.

Discussion

The first purpose of this study was to investigate the replicability of the structure of Keyes's 3-factor model of mental health in college students. The second purpose was to determine whether PGI would be a parsimonious predictor of the three domains of

Table 3
 Model 7: Factor Loadings for the Measurement Model for Women and Men in Group A and Group B

Measured variable	Standardized factor loading Group A		Standardized factor loading Group B	
	Women	Men	Women	Men
Psychological well-being				
Self-acceptance	.69 ^a	.75 ^a	.78 ^a	.77 ^a
Purpose in life	.45*	.50*	.60*	.51*
Environmental mastery	.71*	.66*	.63*	.77*
Positive relations	.63*	.53*	.59*	.63*
Autonomy	.47*	.54*	.32*	.38*
Social well-being				
Social acceptance	.48 ^a	.45 ^a	.49 ^a	.53 ^a
Social actualization	.50*	.48*	.58*	.61*
Social contribution	.71*	.68*	.61*	.58*
Social coherence	.61*	.61*	.36*	.40*
Social integration	.60*	.64*	.67*	.69*
Emotional well-being				
Positive affect	.73 ^a	.68 ^a	.80 ^a	.71 ^a
Life satisfaction	.94*	.89*	.90*	.91*
Happiness	.92*	.95*	.93*	1.00*
Personal growth initiative				
PGI 1	.73 ^a	.64 ^a	.57 ^a	.68 ^a
PGI 2	.81*	.78*	.73*	.78*
PGI 3	.72*	.61*	.69*	.61*
PGI 4	.45*	.37*	.52*	.30*
PGI 5	.77*	.78*	.70*	.76*
PGI 6	.80*	.74*	.77*	.79*
PGI 7	.73*	.67*	.63*	.62*
PGI 8	.64*	.57*	.60*	.54*
PGI 9	.62*	.51*	.66*	.55*

Note. PGI = personal growth initiative.

^a Parameter fixed to 1.0 to aid in identification.

* $p < .05$.

mental health among college students. Both hypotheses were supported in Groups A and B. Exploratory analyses provided evidence supporting invariance in these results for men and women.

The support for Keyes's model of mental health, in these two samples of college students and across women and men, suggests that the model may be a useful tool for college counseling centers. Despite counseling psychology's traditional emphasis on positive functioning (Gelso & Fretz, 2001), university counselors often work with students with severe psychopathology and life stressors (Pledge, Lapan, Heppner, Kivlighan, & Roehlke, 1998), and they must be helpful to the student within a brief therapy modality. This allows little time to focus on positive functioning. The brief version of the measures of mental health used in the current study could allow university counselors to assess students' mental health along with psychopathology without adding undue burden to the student or counselor. This could inform the counselor and the student about strengths that could be used in the counseling process.

Regarding the second hypothesis, PGI predicted all three mental health domains for both genders in both groups. Accounting for covariance among the domains, the amount of variance accounted for by PGI is striking. This is true particularly for social and psychological well-being, ranging from approximately one-fifth to one-half of the variance in these domains. The results suggest that

college students who are engaging in more intentional self-improvement (i.e., have relatively high levels of PGI), in comparison with their low-PGI peers, accept themselves more, have better relationships with others, see more purpose in life, perceive more control and mastery over their environment, and have a greater sense of autonomy or self-direction regarding their lives and daily choices. Similarly, they have a greater feeling of connection to their community, more understanding of the social world around them, a greater sense of contributing to their communities, a forward-looking perspective on society, and a generally favorable view of the people in their world. They also report feeling happier, having greater life satisfaction, and overall, having more positive feelings. The data from this study clearly suggest that participants with higher levels of PGI also were mentally healthier (as defined by Keyes) than were those with low PGI.

Given the relative consistency of these relations for both female and male college students, the inherently active aspects of PGI, and decades of psychotherapy theory postulating that personal growth brings mental health, it seems reasonable to speculate that PGI may be a causal agent in determining a person's mental health (although this clearly was not tested in the current study, with its correlational data). More specifically, it is possible that PGI may enhance a person's mental health. For example, a man who is experiencing difficulties in his interpersonal relations who has a

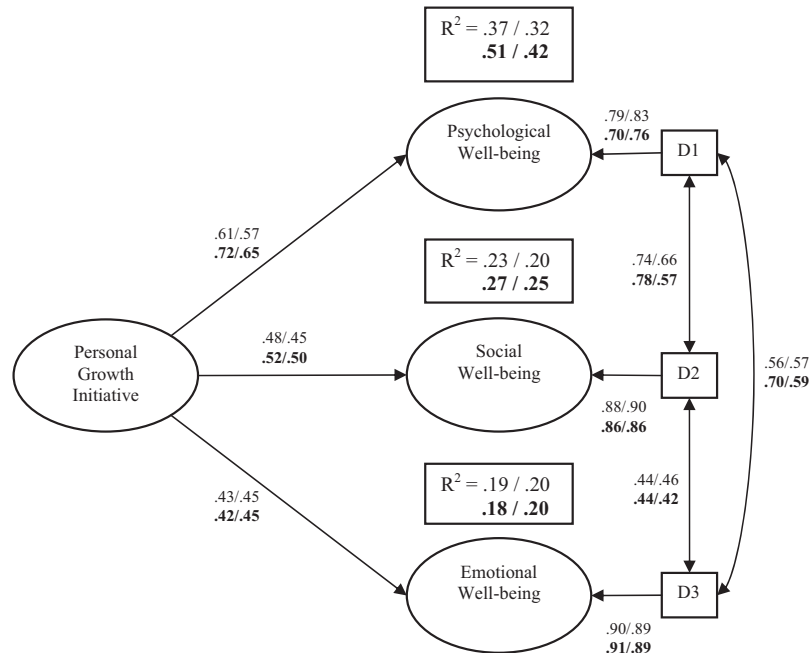


Figure 1. Model 9: Personal growth initiative predicting Keyes's three-factor model of mental health, reporting standardized parameter estimates for women/men in Group A (in regular type) and Group B (in boldface type). All coefficients are significant at $p < .05$.

high level of PGI may explore his patterns of interacting with other people. He may intentionally grow as a person by improving his communication skills and his ability to express care and concern for others. In doing this, his levels of positive relations with others (psychological well-being), social integration (social well-being), and positive affect (emotional well-being) increase. Conversely, a woman with a low level of PGI who is experiencing similar interpersonal difficulties may be resistant to looking inward for the cause of these difficulties. Or she may simply be unaware of the possibility that the cause may lie within her. So she may look outside of herself for the causes of her interpersonal conflicts. Because each person has little chance of effecting change in others, she may have continued low levels of positive relations with others, social integration, and positive affect, despite her efforts.

There are several limitations to the current study. First, although this study addressed an age gap in the literature on Keyes's model (ages 18–24), one cannot assume that the college students in this study are representative of all young adults in this age group, particularly young adults who have not attended college and young adults of color. Second, all measures in this study were self-report, which can lead to shared method variance spuriously increasing relations among the variables. Future research should use multimethod designs to test Keyes's model of mental health. Third, many of the measured variables evidenced low estimates of internal consistency in this sample. Future research can test Keyes's model and predictors of the model with longer versions of social and psychological well-being that are likely to yield higher estimates of internal consistency. Fourth, similar to prior research, this study examined a population that, on average, is generally healthy. Additional research should test the model in populations with low or unusually high levels of functioning to determine whether the

factor structure remains intact at the extremes of functioning. Finally, this study did not test causal relations of PGI with these domains of mental health. Future research can test a competing model in which domains of mental health predict PGI and test for actual causal effects of PGI on domains of mental health.

Keyes's model gives counselors a structure in which to conceptualize their clients' mental health. It offers a format in which to assess the positive human functioning on which counseling psychology has been grounded since its inception. The striking pattern of relations of PGI with the multiple dimensions of Keyes's model of mental health may suggest a parsimonious mechanism by which to enhance clients' dimension-specific, domain-specific, and overall mental health. Future research can determine whether teaching clients to engage in more intentional personal growth will, in fact, enhance their mental health across many dimensions.

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