

College-Student Personal-Growth and Attributions of Cause



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Little is known about levels of personal growth attributed by students to typical college life experiences. This paper documents two studies of student self-reported and posttraumatic growth and compares growth levels across populations. Both studies measure student attributions of cause to academic and non-academic experiences, respectively. It is suggested that future research on the outcome of college life experiences can use a similar approach with a variety of variables.

Keywords: college life, personal growth, posttraumatic growth, life experiences, attributions of cause, outcome of college

The results of a rapidly growing number of studies document high levels of adversarial growth attributed by survivors in retrospect to coping with negative life experiences (Linley & Joseph, 2004) including war, bereavement, or loss of a child. The Posttraumatic Growth Inventory (PTGI) by Tedeschi & Calhoun (1996) has been the most popular measure of adversarial growth to date (Joseph, Linley, & Harris, 2005; Linley & Joseph, 2004; Tedeschi & Calhoun, 2004). In this context, *adversarial* refers to the negative nature of an experience of interest to researchers. *Growth* refers to personal growth defined as the positive psychological changes described by assessment-instrument items, changes such as the building of interpersonal relationships, a greater appreciation of the value of life, and a realization of new possibilities in life (examples after Tedeschi & Calhoun, 1996). Thus, adversarial growth is personal growth attributed by participants to a naturalistic negative *event* of particular interest to researchers. We stumbled on the PTGI and the relationship between adversarial and personal growth while searching for an instrument for measuring personal growth attributed in retrospect to the sum of naturalistic experiences (both positive and negative) occurring during a *time period* of interest to researchers.

The growth of immediate interest to us is not adversarial, but rather the total personal growth of college students because our long-term goal is to determine how educators can best facilitate growth, whether adversarial or otherwise. Developmental theorists (Chickering, 1969; Chickering & Reiser, 1973; Pascarella & Terenzine, 1991; Perry, 1970) have suggested that students grow in response to the combination of typical experiences of college life. Although researchers have used a variety of instruments to measure both academic and personal growth (for recent examples see Hassan, 2008; Higgins, Lauzon, Yew, Brasweth, & Morley, 2009), little is known about how college-student growth compares to adversarial growth because comparisons require measures obtained with the same instrument. Therefore, we want to measure college-student growth with an instrument that has been used to measure adversarial growth. Tedeschi and Calhoun (2004) implied that the PTGI might be suitable for our purposes by characterizing its items as capturing the core of personal growth (without distinguishing between adversarial and personal growth). We decided to use the PTGI after noting that the developers themselves conducted the first study of non-adversarial growth based on the PTGI by using it to measure levels of personal growth described by college students in a small ($n = 32$) non-trauma comparison group (see study 3 in Tedeschi & Calhoun, 1996).

We conducted the second and third studies of interest ($N = 347$, $N = 117$) by using the PTGI to measure levels of college student personal growth, whether adversarial or otherwise attributed to a single semester of college life (Anderson & Lopez-Baez, 2008, 2011). All three previous studies documented mean levels of student personal growth near the midpoint of the range reported for posttraumatic studies (range 46.00–83.47 for 14 studies summarized by Linley & Joseph, 2004). In our second study, we elicited brief explanations from students to learn how they accounted for their growth (see Anderson & Lopez-Baez, 2011). Explanations were in the form of percentage attributions of total personal

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growth to student-identified naturalistic experiences and to a researcher-identified 3-hour course designed to facilitate growth (student explanations like: college internship accounted for 30% of my total personal growth, finding a job for 40%, 3-hour course of interest to researchers for 15%, miscellaneous other experiences for the remaining 15%). We refer to these explanations as *attributions of cause*. Student attributions of cause to academic experiences supported the appealing idea (to counselors and educators) that personal growth as defined and measured by the PTGI can be intentionally facilitated by activities designed to do so.

The two studies described in the current paper are the fourth and fifth based on the PTGI to measure college-student personal growth that was not strictly adversarial. Both samples are generally similar to those of our previous studies (Anderson & Lopez-Baez, 2008, 2011). The current studies extend the results of our previous ones by (1) measuring the growth attributed by sample members to substantially longer periods of college life and (2) eliciting separate attributions of cause for academic and non-academic experiences, respectively. The primary purpose of Study 1 was to examine the internal validity of student data collected with the PTGI by comparing the descriptive statistics among the results of Study 1 with those of the three previous studies described above (Anderson & Lopez-Baez, 2008, 2011; Tedeschi & Calhoun, 1996). The primary purpose of Study 2 was to measure graduating college-senior attributions of annual personal growth, in retrospect to their freshman, sophomore, junior, and senior years, respectively. Study 2 was descriptive.

Study 1: Cumulative Growth

Research questions 1 and 2 are designed to collect descriptive data. Research question 3 is designed to collect information about the internal validity of our data by testing hypotheses on the basis of comparisons of the results of Study 1 with the results of previous studies (Anderson & Lopez-Baez, 2008, 2011).

Research question 1. What levels of cumulative personal growth do participants describe for their college undergraduate years (descriptive statistics for PTGI scores)?

Research question 2. What cumulative percentage attributions of cause do participants describe for academic experiences (college credit) and non-academic (all other) experiences, respectively, during their college undergraduate years (descriptive statistics for attributions of cause)?

Research question 3. To what extent do the results of comparable studies reflect internal validity (comparisons of statistical results across studies)?

Method

Participants

We recruited participants from among the 147 students in a 3-hour elective course, *Problems of Personal Adjustment*, taught by the first author at a southeastern university. The course covered topics of psychological adjustment and included activities to facilitate student personal growth. Data was collected at the end of the fall semester of 2007. Most students were third- and fourth-year undergraduates in the College of Arts and Sciences or the School of Commerce. A total of 137 students elected to participate (response rate 93.20%). After 15 questionnaires with missing data were eliminated, sample size was 122 (67 men, 55 women). Most participants were Caucasian (4 African Americans, 4 Hispanics, Asians, and Asian Americans) with a mean age of 21.05 (.79) years and a mean college career of 6.54 (1.34) completed semesters. Students were given extra credit for electing to participate.

Measures

Posttraumatic Growth Inventory. Each of the 21 PTGI items (Cronbach alpha = .90, test-retest $r = .71$) describes a single positive psychological change (Tedeschi & Calhoun, 1996). Examples (with corresponding subscale and number of subscale items) include: “A sense of closeness with others” (Relating to Others, 7 items), “I developed new interests” (New Possibilities, 5 items), “A feeling of self-reliance” (Personal Strength, 4 items), “A better understanding of spiritual matters” (Spiritual Change, 2 items), and “My priorities about what is important in life” (Appreciation of Life, 3 items). Participants of trauma studies are instructed to describe the degree of each change resulting from their trauma. Responses are positions on a 6-point Likert-type scale anchored by 0 (no change) and 5 (great change). Total score range is 0 to 105 (per-item basis 0 to 5.00). Tedeschi and Calhoun (1996) reported evidence for concurrent and discriminant validity (their second study 1996) and construct validity (their third study). We have previously reported mean levels of college-student

growth of 59.07 ($SD = 15.77$, $N = 347$; Anderson & Lopez-Baez, 2008) and 60.42 ($SD = 16.61$, $N = 117$; Anderson & Lopez-Baez, 2011).

Blank table. We use a blank, 2-column table to elicit attributions of cause (see Appendix A). In column 1, participants list life experiences thought to have contributed most to their growth during their college years. Participants list estimates of corresponding percentage contributions to total growth in column 2. For purposes of this study, we tailored the table to provide subtotals of attributions of cause to academic experiences (lines 1–5) and non-academic experiences (lines 6–10). We pre-labeled Lines 4, 5, and 10. Line 4 refers to the course taught by the principal author from which participants were recruited.

Procedure

Like subjects in our two previous studies, participants were instructed to complete a preliminary exercise to stimulate thinking about personal growth by answering questions that distinguished between level and salience of growth. We do not report the results because the research questions of the current study do not involve salience.

After completing the preliminary exercise, participants were given the following instructions for completing the PTGI (after study 3, Tedeschi & Calhoun, 1996):

Consider the degree to which each change listed below [21 items] has occurred in your life during your years as an undergraduate, *whether or not* the change was directly related to university class work. For each change, select the best response from the following scale [6 Likert-type options of Tedeschi & Calhoun, 1996] and write the number in the space provided.

Participants provided attributions of cause by completing the form in Appendix A. Participants were instructed to complete lines 1–10 of column 1 (brief descriptions of experiences thought to have contributed most to total growth) and column 2 (corresponding percentage contributions). Participants also provided 1-line qualitative explanations of how each experience on lines 1–10 of column 1 contributed to their growth (entries not analyzed because not required by research questions).

Results

Cronbach alphas for each subscale calculated from the data of Study 1 are: .87 (all), .82 (Relating to Others), .65 (New Possibilities), .56 (Personal Strength), .82 (Spiritual Change), and .54 (Appreciation of Life). The mean female PTGI score of 71.71 (11.72) is greater than the mean male score of 66.94 (10.98), $t(120) = 2.32$, $p = .022 \leq \alpha = .05$ (2-tail), $d = .42$. Male and female scores were combined because no significant gender differences were found by t-tests of corresponding subscale means (Bonferroni-corrected $\alpha = .01$).

Research Question 1

Table 1 contains descriptive statistics for participant PTGI scores on a total and per-item basis. Magnitudes of Cronbach alphas reported above can be seen to reflect the variations in magnitude among the standard deviations reported for per-item subscale scores in Table 1 (larger Cronbach alphas are associated with larger standard deviations). This observation suggests that restricted ranges among our data for Personal Strength and Appreciation of Life account for the low values of alpha for each subscale.

The mean total of 69.09 ($SD = 11.52$) is greater than the midpoint of 52.50 for the maximum range of 0–105 and greater than the midpoint of 64.74 for the range of 46.00–83.47 reported for trauma studies (Linley & Joseph, 2004). The

per-item mean of 3.29 ($SD = .55$) exceeds 3 or “moderate growth” on the 0 to 5 response scale (scale midpoint = 2.50). The per-item means for four of the five subscales are between 3.30 ($SD = .77$) and 3.65 ($SD = .62$), inclusive. The per-item mean for Spiritual Change is lower, 1.68 ($SD = 1.17$).

Table 1

Personal Growth Scores (N = 122): Descriptive Statistics (total and per-item basis)

S	Total		Per-item		Subscale inter-correlations					
	M	SD	M	SD	1	2	3	4	5	6
1	23.10	5.40	3.30	.77	--	.46	.48	.44	.55	.88
2	17.84	3.18	3.57	.64		--	.35	.26	.37	.68
3	14.58	2.48	3.65	.62			--	.38	.39	.68
4	3.35	2.33	1.68	1.17				--	.46	.64
5	10.22	1.99	3.41	.66					--	.71
6	69.09	11.52	3.29	.55						--

Note. S Subscales: 1 Relating to Others, 2 New Possibilities, 3 Personal Strength, 4 Spiritual Change, 5 Appreciation of Life, 6 total. *Probability note:* PPA inter-correlations, $p < .00$ (two-tailed) for all r .

Research Question 2

Table 2 contains descriptive statistics for participant percentage attributions of cause to academic and non-academic experiences, respectively (from column 2 of Appendix A). Both subtotals are large although the non-academic subtotal is larger by a ratio of approximately 3:2. The three academic experiences thought by each participant to have contributed most to his or her growth account for 30.76% ($14.79 + 8.03 + 7.94\%$) of the mean subtotal of 39.63% ($SD = 11.94$) of total personal growth. Illustrative examples include internships, terms abroad, and three-credit semester courses. Participants attribute the third largest contribution (7.94%) to a course designed to facilitate growth. Three non-academic experiences account for 50.31% ($25.96 + 15.18 + 9.17\%$) of the mean subtotal 60.36% ($SD = 11.94$). Examples include illnesses, extracurricular activities, deaths of family members, and positive and negative changes in significant relationships.

Table 2

Contributions to Total Personal Growth of Selected Academic and Non-academic Experiences (Attributions of Cause): Descriptive Statistics of Column 2 in Appendix A (N = 122 students)

Experience	Academic		Non-academic	
	M	SD	M	SD
First	14.79	7.64	25.96	10.12
Second	8.03	4.44	15.18	6.34
Third	4.19	3.12	9.17	4.66
Course	7.94	6.46	--	--
Fourth	--	--	4.89	3.71
Misc.	4.68	4.53	5.16	6.01
Sum	39.63	11.94	60.36	11.94

Note. First, Second, Third, Fourth = student-identified experiences from Lines 1, 2, 3, and 6, 7, 8, 9 of Appendix A listed in descending order of magnitude, Course = Problems of Personal Adjustment course from Line 4.

Research Question 3

Numerical PTGI scores and percentage attributions of cause are subjective assessments by participants, as are most self-reports. Our research purposes require data with a degree of internal validity (veridicality or truthfulness; that is, correspondence between self-reports and actual subjective impressions). Internal validity can be assessed by comparing results of analyses across samples of multiple studies. For purposes of the following comparisons, we will use words to number our previous studies and a numeral to designate Study 1 of the current paper. Thus, our *sample one* (Anderson & Lopez-Baez, 2008) was a group of 347 students who described total growth in 2005 and 2006 for their preceding semester, $M = 59.07$ ($SD = 15.77$). Our *sample two* (Anderson & Lopez-Baez, 2011) was a group of 117 students who described total growth and attributions of cause in May of 2007 for their preceding semester, $M = 60.42$ ($SD = 16.61$). Our *sample 1* is that of the current study. Samples are characterized by similar demographic characteristics.

Comparison one. Members of samples one and two described total growth for a single semester. Therefore, we expected samples one and two to have similar mean PTGI scores (null 1: unequal mean PTGI scores). A visual inspection finds similar means. Null 1 is rejected on the basis of that visual inspection, Cohen's d of .08 (minimal effect size), and 95% C. I. of -4.71 to 2.01 that includes 0.00 (SE difference = 1.71). As expected, mean total scores of samples one and two are similar.

Comparison two. Members of sample 1 described total growth over more semesters than did members of samples one or two. Therefore, we expected our sample 1 mean PTGI score to be higher than the mean of either sample one or sample

two (nulls 2 and 3: sample 1 mean less than or equal to means of samples one and two, respectively). Nulls 2 and 3 are rejected on the basis of a 1-way ANOVA $F(2, 593) = 20.02, p = .000, \eta^2 = .064$ with an independent variable of 3 groups and dependent variable of student PTGI scores; and Bonferroni *post-hoc* *t*-tests of student PTGI scores: sample one and sample 1, $t(467) = 6.44, p = 0.000 < \alpha = .0167$ (2-tail), $d = .73$; sample two and sample 1, $t(237) = 4.70, p = 0.000 < \alpha = .0167$ (2-tail), $d = .61$; sample one and sample two, $t(462) = .79, p = .430 > \alpha = .0167$ (2-tail), $d = .08$. As expected, the sample 1 mean of 69.09 is greater than the means of both sample one and sample two.

Comparison three. Visual inspection of the subscale per-item mean scores of sample one (Anderson & Lopez-Baez, 2008) and sample two (Anderson & Lopez-Baez, 2011) found that four of the per-item means in each sample are approximately equal and that all four are greater than the corresponding mean Spiritual Change score by 1.50 to 2.00 scale divisions. Therefore, we expected the subscale scores of our sample 1 to exhibit the same pattern. Visual inspection (Table 1) finds that they do. Thus, as expected, the five subscale per-item mean scores of each of our three samples are characterized by four comparatively high and approximately equal subscale mean scores and a comparatively low mean Spiritual Change score.

Comparison four. Members of all three samples completed the same 3-credit course (during different semesters) designed to facilitate personal growth. Members of sample two and sample 1 were asked for attributions of cause for the course (Anderson & Lopez-Baez, 2011). The resulting attributions of cause to a course designed to facilitate growth are themselves evidence of internal validity. We expected members of sample two to attribute a larger percentage of total growth for one semester to the class than members of sample 1 attributed for the longer period of several semesters (directional null 4: sample two mean attributions of cause to course less than or equal to corresponding mean of sample 1). Null 4 is rejected on the basis of an independent $t(237) = 12.18, p = .000 \leq \alpha = .05$ (1-tail), $d = 1.56$. As expected, the sample two mean attribution of cause to the course of 25.28 (14.28)% is greater than the corresponding sample 1 mean attribution of 7.94 (6.46)%.

Comparison five. Concurrent validity is the extent to which different measures of the same construct agree. We formulated Comparison five only after we saw an opportunity to investigate concurrent validity among the data of sample 1 by measuring the correspondence between high and low Spiritual Change scores in sample 1 and the presence or absence of corresponding written attributions of cause, respectively (null 5: no agreement). We defined high participant Spiritual Change scores as per-item mean scores of at least 3.50 scale divisions (at least 1 division above scale midpoint 2.50). Sample 1 contains 11 high scorers (2 students scored 5.00, 1 scored 4.50, 3 scored 4.00, 5 scored 3.50). We defined low Spiritual Change scores as per-item mean scores no larger than 1.50 scale divisions. Sample 1 contains 64 low scorers (14 students scored .00, 17 scored .50, 20 scored 1.00, and 13 scored 1.50). We added 19 questionnaires selected at random from those of the 64 low scorers to provide a sample of 30 questionnaires for analysis.

We examined each sample member's written attributions of cause for evidence of spiritual growth. We defined evidence of spiritual growth narrowly by the wording of the Spiritual Change items (PTGI items 5 and 18). Thus, we defined evidence of spiritual growth as student descriptions of one or more attributions of cause with at least one explicit reference to religion or spirituality including references to worship, God (or other deity or deities), prayer, or religious writings; but not references to ethics, morality, or meaning of life in the absence of the required explicit references. (Example attributions interpreted as evidence include: my faith deepened, came to accept God's will, learned more about Bible; but not: grew in commitment to boyfriend, learned importance of moral behavior, decided on career choice, or obtained new understanding of life). We easily reached consensus on all identifications because of the simple and specific definition of evidence adopted beforehand. Attributions by 6 of the 11 high scorers and 2 of the 19 low scores contained at least one reference to spiritual growth. Half of the 8 attributions with references to spiritual growth referred to religious studies classes.

High and low Spiritual Change scores corresponded to the presence or absence, respectively, of attributions of cause for 24 of 30 sample 1 members, percentage agreement = 80.00%. Spearman r is a measure of agreement between two series of nominal data that does not take into account the probability of chance matches. The probability of chance matches is high among data of interest because the sample is characterized by many low scores and many non-positive attributions of cause. Cohen's κ (1960) is a measure of agreement between two series of nominal data that accounts for the probabilities of chance matches. Cohen's κ was originally developed to assess inter-rater agreement and is widely used

for that purpose. We used it instead to measure agreement after accounting for chance between two series of nominal data rated jointly by consensus. Kappa values have a range 0 to 1 and are interpreted like positive correlation coefficients. Null 5 is rejected on the basis of a Spearman $r = .51, p = .005$ (1-tail) and $\kappa = .44$, approximate $SE = .19$, approximate $p = .013$.

Discussion

Measures

This study is based on a mixed-methods design with two measures for data collection. The first is the PTGI, a self-report instrument developed from standard psychometric techniques. Posttraumatic researchers use the PTGI to measure personal growth attributed to a trauma of interest to researchers. We use the PTGI as described by the instrument developers (Tedeschi & Calhoun, 1996) to measure total personal growth attributed to the sum of experiences during a time period of interest. Our second measure is an open table for obtaining participant attributions of cause for total personal growth. Participants complete the table with written descriptions of personal experiences and estimates of corresponding percentage contributions. The table design is adapted from one introduced in a previous study (Anderson & Lopez-Baez, 2011).

Validity

The purposes of the current study require a degree of veridicality (truthfulness), a form of internal validity. Researchers have reported little evidence of any kind for the validity of subscale scores beyond the results of exploratory factor analysis (see review in Anderson & Lopez-Baez, 2008). This is perhaps the reason why researchers have drawn few conclusions about growth from subscale scores in their results. Our comparisons one to three in the current study demonstrate the existence of predicted relationships among total PTGI scores of three samples and therefore a degree of internal validity for the collection of individual items and total PTGI scores. Comparison four demonstrates the existence of a predicted relationship between the attributions of cause from two studies and therefore a degree of internal validity for data obtained with the table-based approach. Comparison five demonstrates a degree of concurrent validity for both the subscale of Spiritual Change and the table-based approach.

Posttraumatic Growth Inventory as a Measure of Personal Growth

The PTGI was developed as a measure of posttraumatic growth. Tedeschi and Calhoun (2004) described their instrument as reflecting the core of personal growth. The results of the current study offer strong support for Tedeschi and Calhoun's description because the results report high levels of personal growth for students without regard to prior experiences of trauma. We believe that if the PTGI can be used to measure the personal growth of samples of populations as dissimilar as college students and trauma survivors, then the PTGI can probably be used as a measure of personal growth under other circumstances in future studies.

College-Student Growth and Posttraumatic Growth

Magnitude. Theorists have identified the college-student undergraduate years as a time of personal growth in response to both academic and non-academic experiences (Chickering, 1969; Chickering & Reisser, 1993; Perry, 1970) in terms that suggest the definition of personal growth embodied in the items of the PTGI. Researchers have generally confirmed theorist predictions of student growth (c.f., Hassan, 2008; Higgins et al., 2009), but not with measures that allow for comparison of personal growth in response to trauma. Therefore, we are not surprised that the results of the current study reflect student growth. We are surprised, however, by the magnitude of that growth, $m = 69.09$ ($SD = 11.52$) because it is so near the maximum of the range reported in previous studies of posttraumatic growth (Linley & Joseph, 2004). We believe that this comparison helps readers appreciate the magnitude of growth described by each population.

Factor structure and subscales. The developers of the PTGI reported a 5-factor structure for the items of their instrument on the basis of an exploratory factor analysis (Tedeschi & Calhoun, 1996) and developed five corresponding subscales of unequal length. Subsequent posttraumatic studies have reported 2- and 3-factor structures (see review in Anderson & Lopez-Baez, 2008). Taken together, we interpret these EFA results as evidence that the factor structure of posttraumatic growth is not highly differentiated or stable across different samples. The results of several EFA described in our first study (Anderson & Lopez-Baez, 2008) demonstrated that the factor structure of a sample of student scores also lacked differentiation and stability, and therefore resembled that of posttraumatic growth.

Posttraumatic researchers have typically reported descriptive statistics for the total PTGI score and for the original five subscales. We report our results this way in Table 1, but also include recalculations on a per-item average basis (total score and subscale scores divided by number of corresponding items). The per-item format allows for comparisons of scores for subscales of unequal length. The reader can verify by inspection of Table 1 that all of our subscale scores round to 3.50 (to nearest .5 scale units) except the score for Spiritual Change, which rounds to 1.50. We have observed a similar pattern among the results of our previous studies (Anderson & Lopez-Baez, 2008, 2011).

During preparation of this manuscript, we conducted an informal visual comparison (not based on comparative statistics) of intra-sample per-item subscale scores listed in the results of posttraumatic studies cited by Linley and Joseph (2004) and observed that most subscale scores in each sample were of almost equal magnitude. Most of the few exceptions were low subscale scores (greater than 1.00 per-item average scale value) for Spiritual Change. We do not interpret our observation of this pattern as empirical evidence of anything; however, the observation makes us wonder about the empirical relationship between Spiritual Change and the other four subscales and highlights the importance of assessing the internal validity of Spiritual Change to lay the groundwork for any future studies of the internal structure of growth.

Spiritual Change and spiritual growth. Tedeschi and Calhoun (2004) described the PTGI subscales as measures of five domains of personal growth. The results of our comparison three (see results section) reflect a pattern among mean subscale scores in which the per-item mean score for the Spiritual Change subscale is relatively low. This pattern is empirical evidence that growth does not occur uniformly across all domains at the same time, at least for spiritual growth as measured by Spiritual Change. The occurrence of the similar pattern we observed in the samples of many studies invites the following attempt to explain the pattern. An explanation might be especially important to educators and administrators of religious colleges and universities who actively seek to promote spiritual growth of students.

Developmental factors are probably at least partly responsible for the larger Spiritual Change scores in posttraumatic studies. Trauma study participants have generally been older than participants in samples of college students. Perhaps older people like those in many of the trauma-study samples are more likely than college undergraduates to describe spiritual growth. Perhaps spiritual growth is more characteristic of growth in response to trauma than of growth in response to college life. However, these two possibilities do not completely account for the pattern of interest (similar per-item subscale scores for four subscales and lower subscale score for Spiritual Change) because the pattern is not as pronounced among the five per-item subscale means reported by Tedeschi and Calhoun (1996) for their non-trauma comparison group of college undergraduates. The results of our comparison five (see results section) suggest another developmental factor. Comparison five is based on the narrow definition of spiritual growth embodied in the 2-item Spiritual Change scale. Participant interpretations of item content necessarily influence patterns among subscale scores. In particular, differences in religious background could contribute to different interpretations of Spiritual Change items. We recruited our sample members 12 years after Tedeschi and Calhoun recruited theirs, and we recruited ours from a different university in a different part of the United States. Perhaps our sample members have different religious backgrounds than the members of Tedeschi and Calhoun's sample.

Intentional facilitation of growth. Personal growth can occur in response to very different kinds of experiences, from coping with horrible trauma to caring deeply for friends and significant others. Most of these experiences, certainly most of the traumatic ones, seem to arise spontaneously. This conclusion is important to philosophers and developmental theorists because it suggests that personal growth is central to the human condition. Developmental theorists have suggested that personal growth also can occur in response to planned academic activities. This prediction is important to educators and others concerned with how to facilitate growth.

Students in the current study sample attributed 40% of their personal growth to academic activities (see Table 1). We interpret these results as strong support for the prediction of personal growth in response to academic activities. Students in the current study and in the sample of our second study (Anderson & Lopez-Baez, 2011) also attributed substantial growth to a single 3-hour course designed to facilitate personal growth. We interpret these results as support for the prediction that substantial levels of personal growth can be facilitated by specific academic activities designed to do so.

Current study results include attributions of cause for a single academic course designed in part to facilitate growth. The course is generally similar to that described by Hassan (2008) in a study of growth attributed to a health education course. The percentage attributions of cause to the course described in the current study (Table 2) are consistent with percentages reported in our previous study (Anderson & Lopez-Baez, 2011). The results of that preceding study and the study of Hassan (2008) strongly suggest that personal growth can be intentionally facilitated if not taught explicitly. The results of the current study suggest that substantial growth is attributed by students to coursework in general.

Current study results include subtotals of attributions of cause for academic and non-academic experiences, respectively. Sample members report attributions of almost 40% of total personal growth to academic coursework and provide further evidence that personal growth can be intentionally facilitated.

Study 2: Annual Growth

Taken as a whole, the results of Study 1 and three previous studies (Tedeschi & Calhoun, 1996; Anderson & Lopez-Baez, 2008, 2011) suggest that college students like those in the samples attribute substantial personal growth to both academic and non-academic experiences of their college years. These conclusions lead us to wonder just how much growth graduating seniors attribute to each college year. We believe the answer is of interest to college educators and administrators charged with fostering student growth. Answering this question requires a descriptive study of a representative sample drawn from a population of interest. Study 2 uses a simple descriptive design to answer the question for the population of students similar to those in the sample of Study 1.

Research Question

What levels of personal growth do members of a sample of college seniors attribute to each year of their 4-year college careers and what percentages do they attribute to academic and non-academic experiences, respectively?

Method

Participants

Participants were recruited from graduating college seniors enrolled during the spring semesters of 2009 and 2010 in the course described in Study 1. Students earned extra course credit for participating. A total of 117 participants were recruited (70 of the 84 graduating seniors among the 142 students enrolled in the spring of 2009 and 47 of the 67 graduating seniors among the 144 students enrolled in the spring of 2010). A total of 108 participants (59 women and 49 men) remained after eliminating 9 questionnaires with missing data. Most participants were Caucasian (5 African American, 9 Hispanics, Asians, Asian Americans and other). Mean age was 21.64 ($SD = .48$) years. Academic concentrations (and number of students) were: college of arts and sciences (77), commerce school (18), college of engineering (12) and school of architecture (1). Participants completed the survey at the end of the last class meeting, approximately three weeks before graduation.

Measures

We used the PTGI to measure total personal growth. We used the table in Appendix B to elicit attributions of cause. Participants completed the table with annual estimates (in percent) of their personal growth, growth from academic experiences, and growth from non-academic experiences. We also asked participants to identify on a separate page (not shown in Appendix B) the experiences that they thought contributed most to their growth each year and to identify these experiences as either academic or non-academic.

Procedure

The first two pages of the Study 1 and Study 2 questionnaires (warm-up exercise and PTGI) were identical. Study 2 participants followed the instructions in Appendix B to provide attributions of cause.

Results

Subscale Cronbach alphas for our data are .85 (Relating to Others), .57 (New Possibilities), .59 (Personal Strength), .88 (Spiritual Change), and .77 (Appreciation of Life). The male mean PTGI score of 65.71 ($SD = 12.27$) is less than the female mean of 70.02 ($SD = 11.50$), but not significantly less, $t(106) = 1.93$, $p = .056$, $\alpha = .05$ (2-tail). A single significant gender difference was found among subscale scores between the male mean RTO score, $M = 21.27$ ($SD = 6.05$) and the corresponding female mean, $M = 24.46$ ($SD = 5.51$), $t(106) = 2.87$, $p = .005$, $\alpha = .01$ (Bonferroni-corrected 2-tail). Subsequent analyses of PTGI scores in the sample of the current study are based on the combined scores shown in Table 3.

No gender differences were suggested by the results of independent t -tests of corresponding male and female percentages of total, academic, or non-academic growth, respectively, for any college year, $\alpha = .0125$ (Bonferroni-corrected 2-tail for each set of 4 analyses). Therefore, subsequent analyses of percentages of growth are based on the combined scores in Table 4.

Table 3 contains the descriptive statistics for the sample of Study 2. A visual comparison of the contents of Table 3 with those of Table 1 shows that all corresponding entries are approximately equal. Table 4 documents mean attributions of substantial levels of personal growth to both academic and non-academic experiences for each of four years. The mean attribution to non-academic experiences exceeds the mean attribution to academic experiences for every year. The greatest mean growth is attributed to the senior year; the least is attributed to the sophomore year.

Table 3

Personal Growth Scores (N = 108): Descriptive Statistics (total and per-item basis)

S	Total		Per-item		Subscale inter-correlations					
	M	SD	M	SD	1	2	3	4	5	6
1	23.01	5.96	3.29	.85	--	.36	.34	.39	.55	.86
2	17.83	3.18	3.57	.64		--	.42	.31	.30	.66
3	14.55	2.71	3.64	.68			--	.25	.35	.63
4	2.63	2.39	1.31	1.19				--	.35	.60
5	9.99	2.40	3.33	.80					--	.70
6	68.01	12.01	3.24	.57						--

Note. S Subscales: 1 Relating to Others, 2 New Possibilities, 3 Personal Strength, 4 Spiritual Change, 5 Appreciation of Life, 6 total.

Table 4

Student percentage attributions of yearly growth in retrospect to academic and non-academic experiences by year (N = 108 students)

Year	Experience					
	Total		Per-item		Total	
	M	SD	M	SD	M	SD
Freshman	8.83	7.63	15.59	9.22	24.35	11.72
Sophomore	7.13	4.33	10.37	6.43	17.50	7.66
Junior	11.52	7.74	15.29	10.10	26.85	10.13
Senior	11.11	7.74	20.23	10.28	31.30	10.49
Total	38.59	14.81	61.41	14.81	100.00	--

Probability note. Attributions of men and women are combined because no sex differences were by row for t , $\alpha = .05$ (2-tail).

Participants were asked to identify the year of occurrence of the single experience (as defined by participants) to which they attributed the most personal growth (question not shown in Appendix B). Year and corresponding frequencies of selection by participants are: freshman (22), sophomore (9), junior (35), and senior (42). Participants also were asked to identify whether the experience that contributed most to growth was academic or non-academic. Type of experience and frequencies of selection are: academic (27) and non-academic (81). Finally, participants were asked to describe (in words) the experience that contributed most to their growth. Illustrative descriptions include: “getting a job,” “finding a new girlfriend,” “death of a friend,” “learning to live with fraternity brothers,” and “finishing my undergraduate thesis.”

Discussion

Measures

The current study is the fourth we have conducted based on the PTGI for measuring student personal growth and the third based on a table for collecting attributions of cause in the form of quantitative percentages and qualitative descriptions. We believe the results of the four studies support the utility of both measures for measuring growth and the flexibility of both for measuring growth under different circumstances.

College-Student Personal Growth

The mean PTGI score and standard deviation described by the 108 college seniors with a college career of exactly 8 semesters in the sample of Study 2, $M = 68.01$ ($SD = 12.01$) are almost identical to the corresponding statistics described by the 122 college students with a mean college career of 6.54 ($SD = 1.34$) semesters in the sample of Study 1, $M = 69.09$ ($SD = 11.52$). We had expected the mean PTGI score of Sample 2 to exceed that of Sample 1 because the results of our previous studies reflected higher mean scores for more college semesters (Anderson & Lopez-Baez, 2008, 2011; Study 1 of this paper). The simplest way to explain the similarity between the total scores of Study 1 and Study 2 is to remind ourselves that we are comparing data from a cohort as opposed to longitudinal studies, and remind ourselves that college student growth varies widely among students in each sample as illustrated by the large standard deviations for total PTGI scores in each of our studies. The results reflected in Table 4 suggest that the college seniors in our sample attributed substantial growth to both academic and non-academic experiences during all four college years. We believe this pattern is evidence that college faculty and staff can influence the personal growth of many students during every year of a student cohort's progression toward graduation.

General Discussion

We believe Study 1 provides substantial information about the validity of total PTGI scores and also of subscale scores for Spiritual Change. For this reason, we believe the results of Study 1 are of interest to researchers using the PTGI to measure adversarial or personal growth. The high levels of personal growth attributed by students to the sum of their college years and attributions of cause to academic activities will probably interest college administrators and educators.

The same results led us to wonder how student growth and attributions of cause might be distributed over each college year. For this reason, Study 2 seemed a natural extension of Study 1. The descriptive results of Study 2 are among the first to reflect levels of growth attributed by graduating seniors in retrospect to each year of their undergraduate careers. We believe these results will also interest college personnel concerned with facilitating student growth.

We developed the table-based approach used in Studies 1 and 2 to measure attributions of cause. Researchers can adapt the approach for use in future studies of personal growth. We believe that researchers with other research interests can use a similar approach to study a wide variety of other variables.

Limitations

The two studies described in the current paper are based on self-reports. Thus, the results of both are subject to the many potential validity threats associated with self-reports including additional threats to the historical validity of retrospective self-reports. Our research purposes require data with sufficient internal validity. Comparisons of the results of our three studies reflect a degree of internal validity as described in Study 1. However, PTGI scores might be associated with ceiling effects if higher levels of growth are attributed to longer time periods at diminishing rates, and percentage attributions might be associated with recency effects if more vivid recall of recent experiences leads to larger attributions of growth. Finally, because our samples are representative of populations of similar students, but not university students in general, our conclusions do not necessarily apply beyond the population represented by our samples.

Future Research

We plan more studies of college student growth with the long-term goal of learning how best to facilitate growth. We hope that readers can adapt our approach to measuring attributions of cause for use in future studies of personal growth and other variables.

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Appendix A

Specific Experiences that Contributed to your Personal Growth

Consider the experiences (both academic and personal) that contributed most to your Personal Growth during your undergraduate years, *whether or not* the experiences were directly related to work for which you earned academic credit. Name and briefly describe the 3 academic experiences (besides PPA) that contributed most to your Personal Growth on lines 1–3 of Column 1 in Table 1 below. For purposes of this study, academic experiences are defined as those for which you earned academic credit. Note that PPA (including your project) is listed on line 4 for comparison purposes. Next, on lines 6–10, name and briefly describe the 4 non-experiences that contributed most to your Personal Growth.

Column 1 Specific experiences		Column 2 Contribution (%)
Academic credit experiences that contributed most to your Personal Growth during your undergraduate years (i.e., classes, internships, practicums, etc.)		
1. _____	_____	%
2. _____	_____	%
3. _____	_____	%
4. <u>PPA (including project)</u> _____	_____	%
5. <u>Misc. other academic experiences</u> _____	_____	%
Subtotal: Personal Growth from academic experiences	_____	%
Non-academic experiences (if any) that contributed most to Personal Growth during your undergraduate years (i.e., friends, relationships, gains, losses, etc.)		
6. _____	_____	%
7. _____	_____	%
8. _____	_____	%
9. _____	_____	%
10. <u>Misc. other non-academic experiences</u> _____	_____	%
Subtotal: Personal Growth from academic experiences	_____	%
TOTAL GROWTH FROM ALL EXPERIENCES 1–10	<u>100</u>	%

Appendix B

History of Personal Growth during your College Undergraduate Years

Step I. Recall the beginning and ending dates of each of your undergraduate years including the current one. Fill in dates in the blanks of the line below to describe each year.

	Freshman year	Sophomore Year	Junior Year	Senior Year
Dates	$\frac{_}{\text{Mo}} \frac{_}{\text{Yr}} - \frac{_}{\text{Mo}} \frac{_}{\text{Yr}}$	$\frac{_}{\text{Mo}} \frac{_}{\text{Yr}} - \frac{_}{\text{Mo}} \frac{_}{\text{Yr}}$	$\frac{_}{\text{Mo}} \frac{_}{\text{Yr}} - \frac{_}{\text{Mo}} \frac{_}{\text{Yr}}$	$\frac{_}{\text{Mo}} \frac{_}{\text{Yr}} - \frac{_}{\text{Mo}} \frac{_}{\text{Yr}}$

Step II. Consider the total Personal Growth you have experienced during your undergraduate years. Estimate the percent of that total experienced during each year including the current year and place your estimate in the corresponding blank of the following line. *Make sure that the total of your entries on the following line = 100%.*

% of total $\frac{_}{1a} \% + \frac{_}{2a} \% + \frac{_}{3a} \% + \frac{_}{4a} \% = 100 \%$

Step III. For each year above consider what percent of your Personal Growth that year resulted from *academic* experiences (experiences for which you earned academic credit) and how much from *non-academic* (all other) experiences. Fill in the corresponding percentages in the two lines below. Make sure that your academic and non-academic growth for each year (column entries) equal the entry for the corresponding year in Step II (above). *That is, make sure: 1b + 1c = 1a, 2b + 2c = 2a, . . .*

Growth in response to academic experiences			
$\frac{_}{1b} \%$	$\frac{_}{2b} \%$	$\frac{_}{3b} \%$	$\frac{_}{4b} \%$
Growth in response to non-academic experiences			
$\frac{_}{1c} \%$	$\frac{_}{2c} \%$	$\frac{_}{3c} \%$	$\frac{_}{4c} \%$