



Application of the PERMA Model of Well-being in Undergraduate Students

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Abstract

The PERMA model was introduced by Seligman in 2011 to increase and measure well-being. This model defines well-being in terms of Positive Emotion, Engagement, Relationships, Meaning, and Accomplishment (PERMA). Mental health concerns are common in undergraduate students and may prevent them from obtaining optimal well-being. The purpose of this study was to test whether all five PERMA elements of well-being could be constructed from items within the 2018 Purdue University Student Experience at a Research University (SERU) survey. Using confirmatory factor analysis, all five PERMA constructs were supported and demonstrated good model fit statistics. A second order PERMA well-being construct was built and demonstrated adequate model fit with RMSEA = 0.04. All five constructs were significant at $p < .001$. Accomplishment had the highest factor loading (0.76) and Meaning had the lowest factor loading (0.25). Results for this study support use of well-being theory in the context of undergraduate students and provides enhanced understanding of well-being characteristics in this population.

Keywords Well-being · PERMA · Positive psychology · Higher education · College students

Introduction

People desire optimal well-being, but barriers and lack of societal support prevent many individuals from realizing a satisfying, meaningful life. In undergraduate college student populations, common barriers to optimal well-being include anxiety, stress,

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and depression (LeViness et al., 2018; National Institute of Mental Health [NIMH], 2019, Oswalt et al., 2020). According to a 2017 survey of directors at university and college counselling centers, the following three concerns were most prevalent among undergraduate students seen in the centers: anxiety (48.2%), stress (39.1%), and depression (34.5%; LeViness et al., 2018). Additionally, 25.5% of students seen in campus counselling centers were taking prescribed psychotropic medications (LeViness et al., 2018). Similar results were reported in the *2017 National College Health Assessment*, a nationally recognized survey that includes data about health habits, behaviors, and perceptions of college students. This assessment revealed a wide variety of serious self-reported mental health concerns including hopelessness (51.7%), exhaustion not due to physical activity (83.4%), feeling overwhelmed (86.5%), loneliness (63.1%), considered suicide (12.1%), and have attempted suicide (1.9%) (American College Health Association, 2017).

According to 2017 data, the NIMH reported young adults in the United States ages 18–25 years had the highest prevalence of any mental illness (25.8%) as compared to adults between the ages of 26–49 years (22.2%) and adults older than 50 years (13.8%). Young adults between the ages of 18–25 years also had the highest prevalence of serious mental illness (7.5%) compared to adults aged 26–49 years (5.6%) and adults older than 50 years (2.7%; NIMH, 2019). In a national dataset of college students ($N=454,029$), diagnoses and treatment of several mental health conditions increased significantly between 2009 and 2015 (Oswalt et al., 2020). Summatively, these challenges demonstrate college student well-being is threatened; more research is needed to enhance understanding of barriers and facilitators of well-being in this population. Well-being models which examine barriers and facilitators should be tested for relevance in this population.

Barriers to mental health and well-being may hinder college success as young adults transition from adolescence into adulthood, given that mental health and well-being are intricately related. Mental health is defined as effective functioning of daily living that includes productivity (i.e., work or school), positive relationships, and adaptability to change and adversity (American Psychiatric Association [APA], 2018). According to Seligman (2011), positive mental health includes the presence of positive emotions and is not merely the absence of mental illness; this idea is the foundation of positive psychology (Seligman & Csikszentmihalyi, 2000). Positive psychology provides the fundamental basis of Seligman's well-being theory (2011).

Well-being is often included under the larger umbrella of mental health and provides a meaningful measure of societal interest about individual life satisfaction (Office of Disease Prevention and Health Promotion, n.d.). Well-being may be examined broadly or in specific domains (Centers for Disease Control and Prevention, 2018). *Healthy People 2030* defined well-being as overall life satisfaction which reflects health and non-health factors (Office of Disease Prevention and Health Promotion, 2020). Well-being is included in *Healthy People 2030's* Overall Health and Well-being Measures, which are used to evaluate progress toward *Healthy People 2030's* objectives (Office of Disease Prevention and Health Promotion, 2020).

Purpose of the Study

Well-being should be assessed regularly across university and college campuses to inform development of strategies to enhance college student well-being. While not directly assessing student well-being, the *2018 Purdue Student Experience in the Research University* (SERU) survey offered variables that could be indirectly used to assess student well-being. The SERU survey is administered at approximately thirty research intensive universities worldwide to understand student experiences, inform policymaking, and improve academic programs (University of California Berkeley, 2020b). Although data were collected to assess student experiences, the purpose of the current study was to determine whether a model of well-being developed by Seligman (2011) can be supported in a sample of undergraduate college students from a large Midwest university. Previous studies have validated Seligman's model of well-being theory or a portion of the model in the context of adolescent male students between ages 13–18, school employees, college students, and adults (Coffey et al., 2016; Kern et al., 2014, 2015). In the context of college students, the full PERMA model of well-being has not yet been tested. Results of this study are an essential first step in exploration of well-being in this population which may inform policy, research, and practice to support undergraduate student well-being.

Theoretical Framework

In Seligman's theory (2011), well-being is defined as a combination of cognitive happiness (i.e., satisfaction), hedonic happiness (i.e., feeling), and eudaimonia (i.e., meaning). Well-being is predicted by five elements: (a) Positive Emotion, (b) Engagement, (c) Relationships, (d) Meaning, and (e) Accomplishment. These five elements are represented by the acronym PERMA. Each element contributes to well-being, can be pursued for its own sake, and is independently defined and measured. The combination of PERMA elements promotes flourishing, which is optimal functioning of individuals, groups, communities, nations, and society at large (Seligman, 2011). Well-being may be increased by increasing PERMA elements. Positive Emotion includes subjective reports of happiness, hope, joy, and satisfaction. Engagement is an element that represents flow; Engagement refers to focus, interest, or absorption in an activity. Relationships include closeness and connection with family, friends, or colleagues. These relationships are important throughout a person's lifespan and contribute to well-being in many ways. Meaning is belief or membership in something larger than oneself and may be derived from religion, spirituality, or advocacy. The final element, Accomplishment, refers to pursuits that occur throughout life for the sake of 'winning.' Accomplishment often requires perseverance and resilience, and may include academics, athletics, or career achievements (Seligman, 2011).

Table 1 2018 Purdue SERU participants by College

College	Frequency	%
Engineering	1444	28.83
Health & Human Science	802	16.01
Science	619	12.36
Polytechnic Institute	495	9.88
Agriculture	489	9.76
Liberal Arts	383	7.65
School of Management	369	7.37
Exploratory Studies	136	2.72
Pharmacy	133	2.66
Education	92	1.84
Veterinary Technology	31	0.62
Construction Engineering Management	15	0.30

Methods and Sample

The data used in this study were collected at a public land grant university in the Midwestern United States composed of approximately 43,000 students (roughly 33,000 undergraduates and 10,000 graduate students) in 2018. Of these students, approximately 52% were state residents, 34% were out-of-state students, and 14% were international students (Purdue University Undergraduate Admissions, 2018). Data were collected for the purpose of understanding student experiences at a research-intensive university using the 2018 Purdue SERU survey and collected by the Office of Institutional Research, Assessment, and Effectiveness. A total of 5,008 students participated in this survey from various colleges within the university (Table 1). Self-reported demographic data indicated the following sample characteristics: 57% identified as female and 43% identified as male; 90% identified as United States residents (4,507) and 10% identified as international (501); and 12% were considered freshmen, 24% were considered sophomores, 24% were considered juniors, and 40% were considered seniors. Mean age was 20.44 years old.

A census sampling method was used to administer the SERU survey online. All currently registered undergraduate students at the university were invited by email to complete the survey in Spring 2018. The survey was open for 8 weeks; students could start and return to finish the remainder of the survey at their convenience in this timeframe. To increase sample size and lessen survey fatigue, participants were randomized to one of five groups. Only one group (Group 5) completed all survey items, the other four groups were assigned portions of the survey to complete. Students were incentivized to complete the SERU survey via random drawings for Amazon gift cards. Institutional Review Board (IRB) approval was obtained prior to administration of the SERU survey by the Office of Institutional Research, Assessment, and Effectiveness; the data were de-identified prior to analysis of the current study and approved for use by this investigator by the university's IRB.

Data screening was performed to assess assumptions of normality, outliers, and multicollinearity of variables prior to analysis. Graphical visualization, skewness, and kurtosis values were used to assess for normality. Data were examined

visually for outliers; none were observed. Pairwise correlations were calculated for items used in all five latent variables (i.e., Positive Emotion, Engagement, Relationships, Meaning, Accomplishment) to look for multicollinearity.

Measures

The SERU survey was developed at the University of California Berkeley to measure student engagement and has since been used by other peer research institutions across the nation and worldwide. The SERU survey has been used to understand students, identify strengths and weaknesses of the university, support/guide policy changes, and allow comparisons with similar institutions (University of California Berkeley, 2020a). The core content of the SERU is periodically reviewed by a collaborative research team, and has been found reliable over time, with independent factor analyses revealing nine factors (reliability of factors ranged from 0.53–0.92) (Chatman, 2007, 2009, 2011).

Using Seligman's definitions of PERMA and a review of the literature, relevant PERMA items of well-being in the Purdue SERU survey were identified and selected to represent the latent variables of Positive Emotion, Engagement, Relationships, Meaning, and Accomplishment. The primary author selected items, which were shared with one team member for initial consensus. A total of 39 initial items were selected for review. The initial number of items selected for each latent variable was as follows: Positive Emotion (8), Engagement (8), Relationships (10), Meaning (5), and Accomplishment (8). Upon secondary review of the literature, seven items were removed. The remaining items were then shared with the rest of the research team and consensus was reached. Construction of the five latent variables began with a total of 32 items. See Table 2 for a list of the 32 items as they appeared in the 2018 Purdue SERU survey.

Data Analysis

Latent variable modelling was used to empirically test the PERMA model of well-being theory in the context of undergraduate college students using the 2018 SERU dataset. StataSE 16 was used for all data analysis (StataCorp, 2019). Confirmatory factor analysis (CFA) was used to test the PERMA model using selected items from the dataset (Jöreskog, 1969). Model fit and modifications were guided by the following model fit statistics: chi-square goodness of fit test, comparative fit index (CFI), Tucker-Lewis index (TLI), and root mean square error of approximation (RMSEA). Following creation of the five latent PERMA variables by CFA, a second order well-being model was constructed and tested. For this study, ordinal level data were treated as continuous, since measured variable responses for the items contained a minimum of four response categories, which is considered acceptable (Bentler & Chou, 1987; Hancock & Mueller, 2006). Construction of the five latent variables began with a total of 32 items. See Table 2 for a list and description of the 32 SERU items by dimensions of the PERMA model.

Table 2 PERMA variables obtained from 2018 SERU survey

Question	Variable Label	PERMA Construct
Please select your level of agreement or disagreement with the following statements.-I feel valued as an individual at this campus	value	P
Please select your level of agreement or disagreement with the following statements.-I feel that I belong at Purdue University	belong	P
Please select your level of agreement or disagreement with the following statements.-Knowing what I know now, I would still choose to enroll at Purdue University	reenroll	P
Please select your level of agreement or disagreement with the following statements. Purdue University is a welcoming campus	welcome	P
Please select your level of agreement or disagreement with the following statements. Purdue University is a safe and secure campus	safe secure	P
Please select your level of agreement or disagreement with the following statements.-Overall, I feel comfortable with the climate for diversity and inclusion in my classes	class climate	P
Please select your level of agreement or disagreement with the following statements.-Overall, I feel comfortable with the campus climate for diversity and inclusion in my major	major climate	P
Please select your level of agreement or disagreement with the following statements.-Overall, I feel comfortable with the climate for diversity and inclusiveness at Purdue University	campus climate	P
During this academic year, how often have you done each of the following?-Found your courses so interesting that you did more work than was required	more work	E
During this academic year, how often have you done each of the following?-Communicated with the instructor outside of class about issues and concepts derived from a course	communicate	E
How frequently have you engaged in these activities so far this academic year?-Worked with a faculty member on an activity other than course-work (e.g., student organization, campus committee, cultural activity)	activity	E
How frequently during this academic year have you done each of the following?-Studied with a group of classmates outside of class	study group	E
How frequently during this academic year have you done each of the following?-Worked on class projects with classmates outside of class	project	E
How frequently during this academic year have you done each of the following?-Helped a classmate better understand the course material when studying together	help classmate	E
How many professors do you know well enough to ask for a letter of recommendation in support of a letter of recommendation?	letter	R
During this academic year, how often have you done each of the following?-Had a class in which the professor knew or learned your name	name	R
How satisfied or dissatisfied are you with each of the following aspects of your educational experience-Academic advising by faculty	faculty advice	R
How satisfied or dissatisfied are you with each of the following aspects of your educational experience-Academic advising by school or college staff	school advice	R

Table 2 (continued)

Question	Variable Label	PERMA Construct
How satisfied or dissatisfied are you with each of the following aspects of your educational experience-Academic advising by departmental staff	department advice	R
How satisfied or dissatisfied are you with each of the following aspects of your educational experience-Quality of faculty instruction	instruct	R
How many hours do you spend in a typical week (7 days) on the following activities?-Socializing with friends?	friends	R
How many hours do you spend in a typical week (7 days) on the following activities?-Spending time with family?	family	R
How many hours do you spend in a typical week (7 days) on the following activities?-Participating in spiritual or religious activities?	spirit	M
How many hours do you spend in a typical week (7 days) on the following activities?-Attending cultural events, movies, concerts, sports or other entertainment with others	entertain	M
How many hours do you spend in a typical week (7 days) on the following activities?-Performing community service or volunteer activities?	community service	M
How many hours do you spend in a typical week (7 days) on the following activities?-Participating in student clubs or organizations?	club	M
My major challenges me to do my best work	best work	A
My best work is required to earn an A in courses in my major	earn A	A
How many hours do you spend in a typical week (7 days) on the following activities?-Attending classes, discussion sections, or labs?	class	A
How many hours do you spend in a typical week (7 days) on the following activities?-Studying and other academic activities outside of class?	study	A
How frequently have you engaged in these activities so far this academic year?-Chosen challenging courses?	hard class	A
How frequently during this academic year have you done each of the following?-Increased your academic effort due to the high standards of a faculty member	work hard	A

Results

Total sample size for the 2018 SERU was $N=5008$. The amount of missing data was calculated for each of the 32 study items and ranged between 0.3%–13.2%. Initial data screening and analysis were compared between Group 5 (i.e., the group that completed the entire survey) and all other groups. Standardized estimates, standard errors, p values, Cronbach's alpha, and descriptive statistics (mean, standard deviation) were generally similar; thus, the decision was made to use the entire sample ($N=5,008$) for final analyses.

Skewness and kurtosis results were in suggested values of skewness between -3 and $+3$ and kurtosis between -10 to $+10$ (Kline, 2011), with the exception of family (kurtosis = 12.85), spirit (skew = 3.12 and kurtosis = 18.08), and community service (kurtosis = 14.17). Per Tabachnick and Fidell (2013), deviations of normality in terms of skew and kurtosis do not make significant differences in analysis with

samples greater than $N=200$. Pairwise correlations were calculated for items used in all five latent variables (i.e., Positive Emotion, Engagement, Relationships, Meaning, Accomplishment) to look for multicollinearity. Of the 32 items, seven correlations were greater than or equal to 0.70.

Confirmatory factor analysis was performed to test the structural model of well-being theory (Seligman, 2011) for each latent variable. The following steps were conducted for each latent variable model and overall well-being (i.e., Positive Emotion, Engagement, Relationships, Meaning, Accomplishment, and PERMA). Variance of latent variables was constrained to 1. Parameter estimates were standardized to account for differing response scales and to ease interpretability.

Positive Emotion

Initial fit statistics showed poor fit with χ^2 (20, $N=4,499$)=3567.77, $p<0.001$ with RMSEA=0.20, CFI=0.72, TLI=0.61. Modifications were performed to allow covariation of several error terms. Final fit statistics were acceptable with χ^2 (15, $N=4,646$)=290.36, $p<0.001$ with RMSEA=0.06, CFI=0.98, TLI=0.96. Throughout all modifications, all eight factor loadings were significant at $p<0.001$. Factor loadings in the final model ranged from 0.42–0.89 (Table 3). ‘Campus climate’ had the highest factor loading of these eight items, while ‘reenroll’ had the lowest factor loading.

Engagement

Initial fit statistics showed poor fit with χ^2 (9, $N=1,961$)=593.94, $p<0.001$ with RMSEA=0.18, CFI=0.82, TLI=0.70. Three modifications were performed, allowing error terms to covary. Final fit statistics for the model were acceptable with χ^2 (6, $N=1,961$)=64.31, $p<0.001$ with RMSEA=0.07, CFI=0.98, TLI=0.96. Throughout all modifications, all six factor loadings remained significant at $p<0.001$. Factor loadings in the final model ranged from 0.18–0.86 (Table 3). ‘Study group’ had the highest factor loading of these 6 items, while ‘activity’ had the lowest factor loading.

Relationships

The CFA for Relationships was performed using eight items. Initial fit statistics showed marginal fit with χ^2 (20, $N=4,646$)=813.30, $p<0.001$ with RMSEA=0.09, CFI=0.92, TLI=0.89. Suggested modifications from StataSE 16 were performed, allowing covariance of error terms. Fit statistics in the final model demonstrate good model fit with χ^2 (18, $N=4,646$)=174.61, $p<0.001$ with RMSEA=0.04, CFI=0.99, TLI=0.98. ‘Friends’ was not significant in any of the models ($p=0.10$), but all other seven factor loadings were significant at $p<0.001$. In the final model, factor loadings ranged from 0.04–0.90 (Table 3). ‘Faculty advice’ had the highest factor loading of these 8 items and ‘friends’ had the lowest. Despite low factor loadings of ‘friends’ (0.04) and ‘family’ (0.07), these items were retained as the researchers believed they are important to Relationships in undergraduate college students.

Table 3 PERMA model estimates

Item	Standardized estimate	SE	<i>p</i>	Construct
value	.48	.02	<.001	P
belong	.47	.02	<.001	P
reenroll	.42	.02	<.001	P
welcome	.74	.01	<.001	P
safe secure	.67	.02	<.001	P
class climate	.80	.01	<.001	P
major climate	.74	.01	<.001	P
campus climate	.89	.01	<.001	P
more work	.22	.02	<.001	E
communicate	.28	.02	<.001	E
activity	.18	.02	<.001	E
study group	.86	.01	<.001	E
project	.70	.01	<.001	E
help classmate	.83	.01	<.001	E
letter	.17	.02	<.001	R
name	.28	.02	<.001	R
faculty advice	.90	.01	<.001	R
school advice	.78	.01	<.001	R
department advice	.77	.01	<.001	R
instruct	.55	.01	<.001	R
friends	.04	.03	.100	R
family	.07	.02	.003	R
spirit	.46	.02	<.001	M
entertain	.59	.02	<.001	M
community service	.75	.02	<.001	M
club	.55	.02	<.001	M
best work	.44	.03	<.001	A
earn A	.40	.03	<.001	A
class	.26	.03	<.001	A
study	.39	.03	<.001	A
hard class	.55	.03	<.001	A
work hard	.47	.03	<.001	A

Meaning

Results of the CFA for Meaning indicated all four factor loadings were significant at $p < 0.001$. Per fit statistics, χ^2 , RMSEA, CFI, and TLI show good fit to the data. Factor loadings ranged from 0.46–0.75 (Table 3). ‘Community service’ had the highest factor loading of these 4 items and ‘spirit’ had the lowest. No modifications were performed to the model based on χ^2 (2, $N = 1,900$) = 0.62, $p < 0.001$ with RMSEA = 0.00, CFI = 1.00, TLI = 1.00.

Accomplishment

The CFA for Accomplishment was performed with six items. Initial fit statistics showed marginal fit with $\chi^2(9, N=4,577)=314.47$, $p<0.001$ with RMSEA=0.09, CFI=0.84, TLI=0.74. Suggested modifications from StataSE 16 were performed, allowing covariance of multiple error terms. Results of the final Accomplishment CFA demonstrated good model fit per RMSEA, CFI, and TLI with $\chi^2(7, N=4,577)=19.68$, $p<0.001$ with RMSEA=0.02, CFI=0.99, TLI=0.99. All six factor loadings were significant at $p<0.001$ in all models. Factor loadings ranged from 0.26–0.55 (Table 3). ‘Hard class’ had the highest factor loading and ‘class’ had the lowest factor loading of these six items.

Full PERMA Model

The full PERMA model was built as a second order CFA using the previously created latent variables. This model structure is depicted in Fig. 1. Results of the full PERMA model indicated that all five latent variables were significant at $p<0.001$. Initial model fit was $\chi^2(459, N=4,672)=8821.027$, $p<0.001$ with RMSEA=0.06, CFI=0.75, TLI=0.78. To improve model fit, covariances of multiple error terms were allowed. As per previous models, modifications were made one at a time. Variance of Positive Emotion error was constrained to 0.3297871, which was the average calculated error of items in the Positive Emotion CFA model to allow model convergence. Accomplishment had the highest factor loading (0.76) of these five latent variables. Meaning had the lowest factor loading (0.25), indicating weak influence on well-being in this model. In the full PERMA model, all 32 items were significant (Table 4). Final fit statistics were $\chi^2(448, N=4,672)=4355.61$ $p<0.001$ with RMSEA=0.04, CFI=0.88, TLI=0.87. Per the final model fit statistics, RMSEA demonstrated good fit. CFI and TLI trended toward model fit. Table 5 contains fit statistics for all CFA models.

Discussion

This exploratory study: (a) examined whether the PERMA constructs of well-being could be constructed using items from the 2018 Purdue SERU survey and (b) if a second-order well-being construct could be measured using all five PERMA variables, thus supporting application of the theory in the context of undergraduate college students at a large research-intensive university. Results supported the study aims: all five PERMA constructs of well-being and a second order well-being construct were supported using items from the 2018 Purdue SERU data.

This study adds to well-being research by validating the full PERMA model of well-being in undergraduate students attending a large public research university. While the PERMA model of well-being has been strongly validated by many studies, it has not been used to describe well-being in a college-age population (Coffey et al., 2016; Kern et al., 2014, 2015). This study fills that gap and extends understanding of predictors of well-being. Positive Emotion, Engagement, Relationships, Meaning, and Accomplishment are supported as dimensions of well-being in the

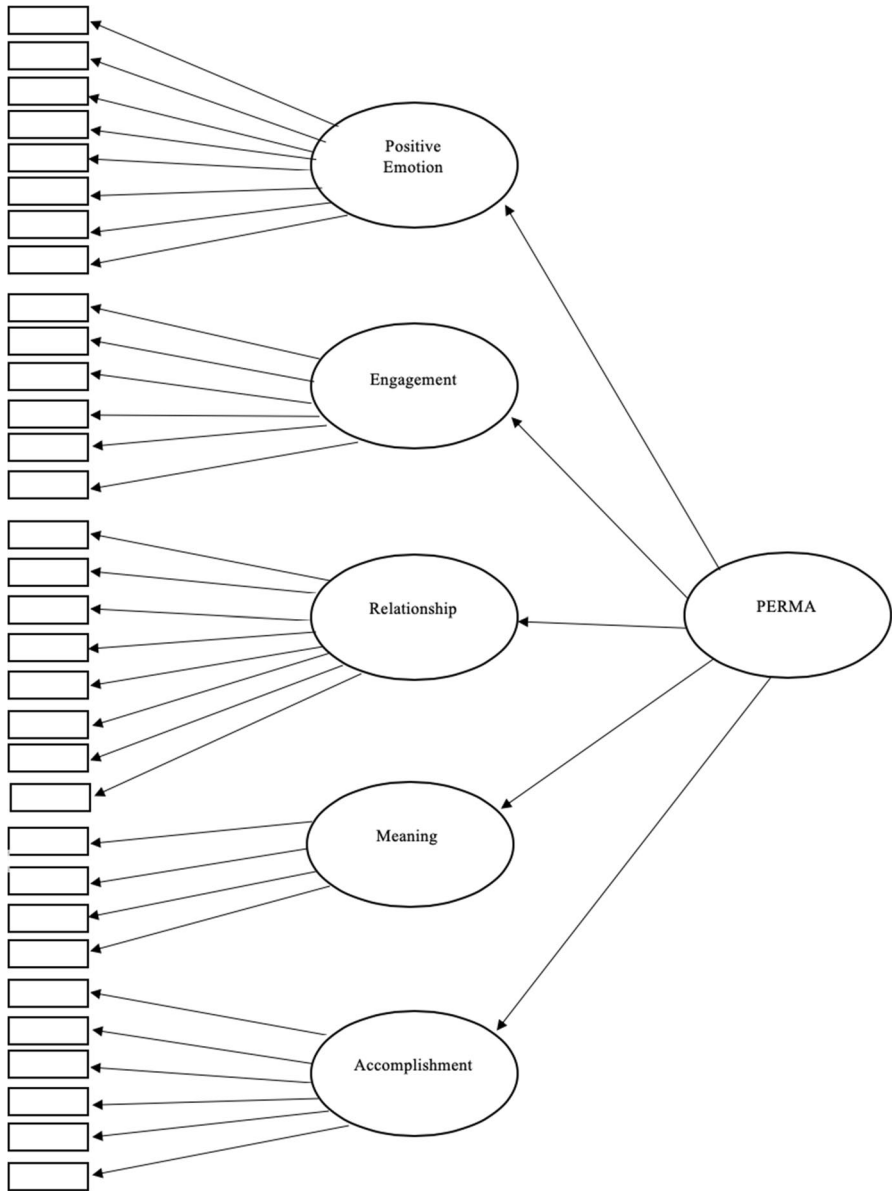


Fig. 1 Final PERMA model. Note. Covariances of the error terms are not shown in the figure

sample and demonstrate significant associations with well-being. As discussed earlier, this population is experiencing multiple challenges to mental health; thus, it is important to identify factors that enhance and support student well-being.

Table 4 PERMA model estimates (items)

Items	Standardized Estimate	SE	<i>p</i>
value	.60	.01	< .001
belong	.60	.01	< .001
reenroll	.54	.02	< .001
welcome	.91	.01	< .001
safe secure	.77	.01	< .001
class climate	.63	.02	< .001
major climate	.59	.02	< .001
campus climate	.73	.01	< .001
more work	.27	.02	< .001
communicate	.32	.02	< .001
activity	.20	.02	< .001
study group	.83	.01	< .001
project	.70	.01	< .001
help classmate	.85	.01	< .001
letter	.18	.02	< .001
name	.29	.02	< .001
faculty advice	.88	.01	< .001
school advice	.78	.01	< .001
department advice	.78	.01	< .001
instruct	.57	.01	< .001
friends	.06	.03	.014
family	.08	.03	.002
spirit	.45	.02	< .001
entertain	.60	.02	< .001
community service	.74	.02	< .001
club	.55	.02	< .001
best work	.59	.02	< .001
earn A	.40	.02	< .001
class	.22	.03	< .001
study	.31	.03	< .001
hard class	.43	.03	< .001
work hard	.50	.03	< .001

Table 5 PERMA model fit statistics

Model	<i>N</i>	χ^2	df	RMSEA	CFI	TLI
Positive Emotion	4499	290.36	15	0.06	0.99	0.96
Engagement	1961	64.31	6	0.07	0.98	0.96
Relationships	4646	174.61	18	0.04	0.99	0.98
Meaning	1900	0.62	2	0.00	1.00	1.00
Accomplishment	1900	19.68	7	0.02	0.99	0.99
PERMA	4672	4355.61	448	0.04	0.88	0.87

Sample sizes vary across models due to randomization of participants and use of full information maximum likelihood (FIML) approach for missing data

Positive Emotions

Within the Positive Emotion model, correlations between the eight items and Positive Emotion were moderate to strong. Moderate-strong correlations were noted between all items, indicating a relationship or overlap between them. These results aligned with those by Chang et al. (2019), who found positive affect was positively correlated with hope and life satisfaction. Positive emotion is often associated with each other; thus, increasing any positive emotion is likely to produce positive benefits.

The three strongest predictors of well-being in this model related to 'diversity and inclusion' in campus, class, and major environments. Feeling 'safe', 'secure', and 'welcome' on campus were moderate contributors to positive emotion. These items reflect basic psychosocial needs, which are fundamental to all humans. Feelings of 'individual value', 'belonging', and 'choice to reenroll' at Purdue University contributed least to Positive Emotion in the model. These findings can be understood per Maslow's (1943) hierarchy of needs, where physiological needs are fundamental to other needs of safety, love, esteem, and self-actualization. When students feel accepted, safe, secure, and valued, they are likely to have a sense of belonging and would choose to reenroll at the same university. All these concepts contribute to Positive Emotion of college students, which adds to well-being.

Engagement

The Engagement model was constructed from six items in the 2018 Purdue SERU survey. Although items do not align purely to Seligman's theoretical definition of Engagement, they were selected as types of Engagement per relevant literature. All six items in the final Engagement CFA model were statistically significant and correlations in this model between items and Engagement varied from weak to strong.

The six items demonstrate dimensions of Engagement with coursework, faculty, and other students. In the current study, the strongest correlation was noted between Engagement and 'study group participation'. 'Helping a fellow classmate' and 'class project participation' also demonstrated statistically significant correlations with Engagement. These three items (i.e., 'study group participation', 'helping a fellow classmate', and 'class project participation') reflect course engagement with fellow students. Mentoring by upperclassmen, participation in collaborative learning activities, and interactions with peers outside of class increased self-confidence, contributed to academic adjustment, provided emotional support, and increased psychosocial wellness (Awang et al., 2014; Berger & Milem, 2002).

The other three items in the model (i.e., 'more work', 'communicate', and 'activity') were significant, and reflect engagement with faculty outside of courses through additional work, discussion of class concepts, and participation in extracurricular activities. These results are confirmed by the literature, which identify a positive relationship between Engagement and faculty interactions (Kim & Lundberg, 2016). Extracurricular engagement with instructors may encourage participation in extracurricular activities and foster a sense of community (Glass et al., 2017).

Engagement in college students revealed associations between engagement, sense of belonging (Kim & Lundberg, 2016; Wilson et al., 2015), self-efficacy (Wilson et al., 2015), and emotional intelligence (Maguire et al., 2017). Benefits of student engagement include cognitive skill development (Kim & Lundberg, 2016). Future studies should examine Engagement opportunities on university campuses to determine which types are most beneficial to well-being.

Relationships

Eight items from the 2018 Purdue SERU survey were selected for the Relationships model. These items assessed relationships with faculty, department staff, friends, and family. 'Friends' was not significant in the model, but all other seven items were statistically significant. Correlations in this model between items and Relationships varied from very weak to strong.

Despite the low factor loadings of 'friends' and 'family', these items were retained as we believed they were important to Relationships in undergraduate college students. Yuan et al. (2016) found family support was associated with increased self-efficacy and improved academic performance. Similarly, kin relationships provided support and increased academic persistence of African American college students (Brooks & Allen, 2016). Peers may predict college adaptation (Turkpour & Mehdinezhad, 2016) and reduce somatic complaints in victims of racial and ethnic discrimination (Juang et al., 2016).

Several explanations are possible for the low factor loadings of 'friends' and 'family'. 'Friends' and 'family' were measured as time-use items in the original survey, whereas the other six items indicated level of satisfaction. This means 'friends' and 'family' were measuring quantity (i.e., time spent) in an average week, rather than quality of these relationships. Another consideration is relationships with family and friends may be less important than relationships with instructors and university staff during the academic semester. Finally, these items were not administered to assess well-being of undergraduate students or the quality of their relationships with family and friends. The items included in this study show relationships with university staff and faculty contribute to college student well-being.

Meaning

Four items from the 2018 Purdue SERU survey were selected for the Meaning model. Factor loadings of all four items were statistically significant, correlations in this model between items and Meaning varied from moderate to strong.

In the present study, 'spiritual practice' was the weakest predictor of Meaning. Some students may not identify as religious or spiritual, thus spiritual time may not be an applicable predictor of well-being in all students. Results indicated the strongest association was between Meaning and 'community service'. These results are supported by the literature with community service participation associated with increased Meaning and psychosocial wellness among college student participants

(Berger & Milem, 2002; Rockenbach et al., 2014). On a theoretical level, these results are supported by Seligman's (2011) definition that Meaning can be obtained by group advocacy or membership; participation in community service or volunteer activities should increase Meaning by helping others and civic engagement.

Results from these four items indicate college students derived most Meaning from participation in volunteer or community service. Attending cultural events, movies, concerts, sports, or other entertainment activities was the second most influential predictor of Meaning. Participation in student organizations or clubs also contributed to Meaning, and lastly religion/spiritual practice contributed the least to Meaning in this sample. Universities and colleges offer many organizations, events, and opportunities that may contribute to a sense of meaning and purpose in students. These opportunities should be identified to incoming students and highlighted regularly for current students, so that meaning can be fostered and contribute to well-being of college students.

Accomplishment

Six items from the 2018 Purdue SERU survey were selected for the Accomplishment model. All six items were statistically significant, correlations in this model between items and Accomplishment varied from low to moderate.

The items 'best work' and 'earn A' reflect being challenged in major classes, and the belief that best efforts are needed to earn A's in major courses. 'Class' and 'study' indicate time spent in class or studying in a typical week. 'Hard class' demonstrated the deliberate act of choosing challenging courses, and 'work hard' indicated increased academic efforts to meet the high standards of a faculty member. These six items suggest that Accomplishments require intentional choices and behaviors to achieve them; they do not occur without conscious thought and actions. These sentiments are noted in Seligman's (2011) definition of Accomplishment.

Moving forward, academic faculty and advisors should encourage students to enroll in challenging courses to promote Accomplishment. Challenging courses will require best efforts, but will likely benefit some students by increasing academic success and increasing well-being. Time in class, although significant to Accomplishment, was the weakest predictor of Accomplishment. Thus, time in class seems less important than choice of class and efforts in coursework. Results from this study, which highlight choices and behaviors necessary to succeed, combined with identified barriers and facilitators from the literature, created a detailed picture of Accomplishment in college students.

PERMA Well-being

In the second-order well-being model, Accomplishment demonstrated the strongest correlation to well-being while Meaning demonstrated the weakest correlation to well-being. These results mirrored previous studies that found Accomplishment to be the strongest predictor of well-being in adult samples and college student samples (Coffey et al., 2016). This finding is not surprising, given the sample was comprised

of undergraduate students at a research-intensive university. Having a sense of accomplishment may contribute to positive affect or satisfaction with life. These ideas are identified in subjective well-being and psychological well-being theories (Bloch-Jorgensen et al., 2018). Previous studies have found a correlation between happiness and measures of success (Boehm & Lyubomirsky, 2008; Lyubomirsky et al., 2005; Moussa & Ali, 2022). Similar results were demonstrated in a recent study of college students in the United Arab Emirates where higher levels of happiness were correlated with academic success during the COVID-19 lockdown (Moussa & Ali, 2022). It seems plausible that Accomplishments would be a strong predictor in the current model, as college students are pursuing academic endeavors and looking for future career success. Meaning—although found to be the weakest predictor of well-being in the model—should not be discounted. Having a sense of meaning or purpose in life contributes to psychological well-being (Bloch-Jorgensen et al., 2018). Meaning may be less important than other psychosocial concerns in this age group as they transition from adolescence to adulthood. Meaning may be something that undergraduate students are still searching for or something to be obtained later when they develop a stronger sense of self.

Seligman (2011) created the PERMA model to describe well-being, and thus be used to guide individuals toward optimal well-being. The multidimensional PERMA model includes both hedonic and eudaemonic elements, and thus looks at well-being from a comprehensive perspective. There is no universal route to flourishing; there are infinite possibilities which are subjective and person-specific. Individuals will derive varying levels of benefits and satisfaction from each PERMA element. Keeping these five elements in mind to guide personal decisions and actions will increase individual well-being (Seligman, 2011).

Implications

Future initiatives to assess and improve college student well-being may consider use of survey items that measure PERMA constructs or conduct assessments with validated tools developed from well-being theory, such as the PERMA meter (Seligman, 2016) or PERMA profiler (Butler & Kern, 2016). Since well-being is a fluid ever-changing construct, collection of longitudinal data from initial enrollment to graduation would reveal a multidimensional perspective of well-being across the college experience. Ideally, postgraduate and alumni surveys should also include well-being items, which would provide insight of graduates as they enter the workforce. Examination of results by demographic variables (i.e., race/ethnicity, gender, international/native, age, college/major) may provide further insight into facilitators and barriers to well-being, especially in diverse university populations.

Limitations

There are limitations to this study. First, cross-sectional data were used for this study, provided information only at the time of data collection. Caution should be advised in making causal interpretations from cross-sectional data about student well-being (Menard,

2002). Second, data were self-reported and may be subject to response or social desirability bias. Bias may have been introduced into the study as participants were incentivized, which may have influenced their responses in a more positive fashion. Third, the study used secondary data collected to understand student experiences, not for the purposes of this study. PERMA constructs were created using available survey items in accordance with Seligman's theoretical definitions of Positive Emotion, Engagement, Relationships, Meaning, and Accomplishment. Some constructs (e.g., Engagement) were guided by review of the literature, rather than theoretical definition. Future well-being assessments should be conducted for the purpose of understanding student well-being and include primary data collection. Use of standardized instruments in future studies may provide different results and potentially increase factor loadings in PERMA models. Finally, the sample consisted of undergraduate students from one large public research university in Midwestern United States. Caution is advised in generalizing results of this study to other populations. Replication should be performed with diverse settings and populations.

Conclusions

Well-being is a holistic, multidimensional construct that provides insight into the condition or state of being. Although definitions and measurements vary, well-being assessments provide valuable information about individuals and groups. This information is valuable to researchers, employers, policymakers, and governments. Such results may be useful to inform programming, policy, or funding to support the well-being of individuals, communities, and nations.

As discussed earlier, a high prevalence of mental health concerns, including anxiety, stress, and depression, has been noted in college students in the United States (LeViness et al., 2018; NIMH, 2019; Oswald et al., 2020). Additional threats to mental health may be exacerbated due to the ongoing COVID-19 pandemic. Understanding levels of well-being in undergraduate students is necessary to identify areas of strength and weakness, which could then be targeted by university programs. The PERMA framework is unique as Seligman proposed its use to measure and build well-being of individuals and communities. Findings from this study may be useful to promote and increase the well-being of undergraduate students.

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Declarations

Approval was obtained from the university internal review board for this study.

Informed Consent Obtained by the university Office of Institutional Research, Assessment, and Effectiveness (original administrators of the survey).

Conflict of Interest The authors have no relevant financial or competing interests to disclose.

References

- American College Health Association. (2017). *National college health assessment II: Reference group executive summary fall 2017*. https://www.acha.org/documents/ncha/ncha-II_fall_2017_reference_group_executive_summary.pdf. Accessed 7 Apr 2020
- American Psychiatric Association. (2018). *What is mental illness?* <https://www.psychiatry.org/patients-families/what-is-mental-illness>
- Awang, M., Kuty, F., & Ahmad, A. (2014). Perceived social support and well being: First-year student experience in university. *International Education Studies*, 7(13), 261–270. <https://doi.org/10.5539/ies.v7n13p261>
- Bentler, P., & Chou, C. (1987). Practical issues in structural modeling. *Sociological Methods & Research*, 16(1), 78–117. <https://doi.org/10.1177/0049124187016001004>
- Berger, J. B., & Milem, J. F. (2002). The impact of community service involvement on three measures of undergraduate self-concept. *NASPA Journal*, 40(1), 85–103. <https://doi.org/10.2202/1949-6605.1190>
- Purdue University Undergraduate Admissions. (2018). *Student enrollment, fall 2018*. <https://www.admissions.Purdue.edu/academics/enrollment.php>. Accessed 7 Apr 2020
- Bloch-Jorgensen, Z. T., Cilione, P. J., Yeung, W. W., & Gatt, J. M. (2018). Centeredness theory: Understanding and measuring well-being across core life domains. *Frontiers in Psychology*, 9, 610. <https://doi.org/10.3389/fpsyg.2018.00610>
- Boehm, J. K., & Lyubomirsky, S. (2008). Does happiness promote career success? *Journal of Career Assessment*, 16(1), 101–116. <https://doi.org/10.1177/1069072707308140>
- Brooks, J. E., & Allen, K. R. (2016). The influence of fictive kin relationships and religiosity on the academic persistence of African American college students attending an HBCU. *Journal of Family Issues*, 37(6), 814–832. <https://doi.org/10.1177/0192513X14540160>
- Butler, J., & Kern, M. L. (2016). The PERMA-profiler: A brief multidimensional measure of flourishing. *International Journal of Wellbeing*, 6(3), 1–48. <https://doi.org/10.5502/ijw.v6i3.526>
- Centers for Disease Control and Prevention. (2018). *Well-being concepts*. <http://www.cdc.gov/hrqol/wellbeing.htm>. Accessed 7 Apr 2020
- Chang, E. C., Chang, O. D., Li, M., Xi, Z., Liu, Y., Zhang, X., Wang, X., Li, Z., Zhang, M., Zhang, X., & Chen, X. (2019). Positive emotions, hope, and life satisfaction in Chinese adults: A test of the broaden-and-build model in accounting for subjective well-being in Chinese college students. *The Journal of Positive Psychology*, 14(6), 829–835. <https://doi.org/10.1080/17439760.2019.1579358>
- Chatman, S. (2007). *A common factor solution for UCUES 2006 upper-division core items*. Center for Studies in Higher Education, University of California, Berkeley. https://cshe.berkeley.edu/sites/default/files/SERU_TechR_FactorAnalysis1.6.20.pdf. Accessed 7 Apr 2020
- Chatman, S. (2009). *Factor structure and reliability of the 2008 and 2009 SERU/UCUES questionnaire core*. Center for Studies in Higher Education, University of California, Berkeley. https://cshe.berkeley.edu/sites/default/files/Chatman_TechReport.10.29.09.pdf. Accessed 7 Apr 2020
- Chatman, S. (2011). *Factor structure and reliability of the 2011 SERU/UCUES questionnaire core*. Center for Studies in Higher Education, University of California, Berkeley. <https://cshe.berkeley.edu/sites/default/files/Chatman.SERUTechReport.FactorStructure.11.29.2011.pdf>. Accessed 7 Apr 2020
- Coffey, J. K., Wray-Lake, L., Mashek, D., & Branand, B. (2016). A multi-study examination of well-being theory in college and community samples. *Journal of Happiness Studies*, 17(1), 187–211. <https://doi.org/10.1007/s10902-014-9590-8>
- Glass, C. R., Gesing, P., Hales, A., & Cong, C. (2017). Faculty as bridges to co-curricular engagement and community for first-generation international students. *Studies in Higher Education*, 42(5), 895–910. <https://doi.org/10.1080/03075079.2017.1293877>
- Hancock, G., & Mueller, R. (Eds.). (2006). *Structural equation modeling: A second course (Quantitative methods in education and the behavioral sciences)*. IAP.
- Jöreskog, K. G. (1969). A general approach to confirmatory maximum likelihood factor analysis. *Psychometrika*, 34(2), 183–202. <https://doi.org/10.1007/bf02289343>
- Juang, L., Ittel, A., Hoferichter, F., & Gallarin, M. M. (2016). Perceived racial/ethnic discrimination and adjustment among ethnically diverse college students: Family and peer support as protective factors. *Journal of College Student Development*, 57(4), 380–394. <https://doi.org/10.1353/csd.2016.0048>
- Kern, M. L., Waters, L., Adler, A., & White, M. (2014). Assessing employee wellbeing in schools using a multifaceted approach: Associations with physical health, life satisfaction, and professional thriving. *Psychology*, 5(6), 500–513. <https://doi.org/10.4236/psych.2014.56060>

- Kern, M. L., Waters, L. E., Adler, A., & White, M. A. (2015). A multidimensional approach to measuring well-being in students: Application of the PERMA framework. *The Journal of Positive Psychology, 10*(3), 262–271. <https://doi.org/10.1080/17439760.2014.936962>
- Kim, Y. K., & Lundberg, C. A. (2016). A structural model of the relationship between student–faculty interaction and cognitive skills development among college students. *Research in Higher Education, 57*(3), 288–309. <https://doi.org/10.1007/s11162-015-9387-6>
- Kline, R. B. (2011). *Principles and practice of structural equation modeling* (3rd ed.). Guilford Press.
- LeViness, P., Bershad, C., & Gorman, K. (2018). *The Association for University and College Counseling Center Directors: Reporting period: July 1, 2016 through June 30, 2017*. AUCCCD. https://www.aucccd.org/assets/2017aucccd_survey-public-apr17.pdf. Accessed 7 Apr 2020
- Lyubomirsky, S., King, L., & Diener, E. (2005). The benefits of frequent positive affect: Does happiness lead to success? *Psychological Bulletin, 131*(6), 803. <https://doi.org/10.1037/0033-2909.131.6.803>
- Maguire, R., Egan, A., Hyland, P., & Maguire, P. (2017). Engaging students emotionally: The role of emotional intelligence in predicting cognitive and affective engagement in higher education. *Higher Education Research & Development, 36*(2), 343–357. <https://doi.org/10.1080/07294360.2016.1185396>
- Maslow, A. H. (1943). A theory of human motivation. *Psychological Review, 50*, 370–396.
- Menard, S. (2002). *Longitudinal research* (2nd ed.). Sage Publications.
- Moussa, N. M., & Ali, W. F. (2022). Exploring the relationship between students' academic success and happiness levels in the higher education settings during the lockdown period of COVID-19. *Psychological Reports, 125*(2), 986–1010. <https://doi.org/10.1177/0033294121994568>
- National Institute of Mental Health (NIMH). (2019). *Mental illness*. <https://www.nimh.nih.gov/health/statistics/mental-illness.shtml>. Accessed 7 Apr 2020
- Office of Disease Prevention and Health Promotion. (2020). *Health-related quality of life and well-being*. <https://www.healthypeople.gov/2020/about/foundation-health-measures/health-related-quality-of-life-and-well-being>. Accessed 7 Apr 2020
- Office of Disease Prevention and Health Promotion. (n.d). *Overall health and well-being measures*. <https://health.gov/healthypeople/objectives-and-data/overall-health-and-well-being-measures>. Accessed 7 Apr 2020
- Oswalt, S. B., Lederer, A. M., Chestnut-Steich, K., Day, C., Halbritter, A., & Ortiz, D. (2020). Trends in college students' mental health diagnoses and utilization of services, 2009–2015. *Journal of American College Health, 68*(1), 41–51. <https://doi.org/10.1080/07448481.2018.1515748>
- Rockenbach, A. B., Hudson, T. D., & Tuchmayer, J. B. (2014). Fostering meaning, purpose, and enduring commitments to community service in college: A multidimensional conceptual model. *The Journal of Higher Education, 85*(3), 312–338. <https://doi.org/10.1080/00221546.2014.11777330>
- Seligman, M. E. P., & Csikszentmihalyi, M. (2000). Positive psychology: An introduction. *American Psychologist, 55*(1), 5–14. <https://doi.org/10.1037/0003-066X.55.1.5>
- Seligman, M. E. P. (2011). *Flourish: A visionary new understanding of happiness and well-being*. Atria Books.
- Seligman, M. E. P. (2016). *PERMA meter*. <https://www.authentic happiness.sas.upenn.edu/testcenter>. Accessed 7 Apr 2020
- StataCorp. (2019). *Stata Statistical Software: Release 16*. StataCorp LLC.
- Tabachnick, B. G., & Fidell, L. S. (2013). *Using multivariate statistics*. Pearson Education.
- Turkpoor, A., & Mehdinezhad, V. (2016). Social support, academic support and adaptation to college: Exploring the relationships between indicators of college students. *New Educational Review, 44*(1), 84–95. <https://doi.org/10.15804/ner.2016.44.2.07>
- University of California Berkeley. (2020a). *SERU history*. <https://cshe.berkeley.edu/seru/about-seru/seru-history>. Accessed 7 Apr 2020
- University of California Berkeley. (2020b). *SERU mission*. <https://cshe.berkeley.edu/seru/seru-mission>. Accessed 7 Apr 2020
- Wilson, D., Jones, D., Bocell, F., Crawford, J., Kim, M. J., Veilleux, N., Floyd-Smith, T., Bates, R., & Plett, M. (2015). Belonging and academic engagement among undergraduate STEM students: A multi-institutional study. *Research in Higher Education, 56*(7), 750–776. <https://doi.org/10.1007/s11162-015-9367-x>
- Yuan, S., Weiser, D. A., & Fischer, J. L. (2016). Self-efficacy, parent-child relationships, and academic performance: A comparison of European American and Asian American college students. *Social Psychology of Education, 19*(2), 261–280. <https://doi.org/10.1007/s11218-015-9330-x>

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