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A multidimensional approach to measuring well-being in students: Application of the PERMA framework

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Seligman recently introduced the PERMA model with five core elements of psychological well-being: positive emotions, engagement, relationships, meaning, and accomplishment. We empirically tested this multidimensional theory with 516 Australian male students (age 13–18). From an extensive well-being assessment, we selected a subset of items theoretically relevant to PERMA. Factor analyses recovered four of the five PERMA elements, and two ill-being factors (depression and anxiety). We then explored the nomological net surrounding each factor by examining cross-sectional associations with life satisfaction, hope, gratitude, school engagement, growth mindset, spirituality, physical vitality, physical activity, somatic symptoms, and stressful life events. Factors differentially related to these correlates, offering support for the multidimensional approach to measuring well-being. Directly assessing subjective well-being across multiple domains offers the potential for schools to more systematically understand and promote well-being.

Keywords: Well-being theory; multidimensional approach; positive psychology; measurement; positive education; adolescents

In 2009, Seligman, Ernst, Gilham, Reivich, and Linkins defined positive education as 'education for both traditional skills and for happiness' (p. 293). More recently, Seligman (2011) introduced the PERMA model of flourishing, in which psychological well-being is defined in terms of five domains: positive emotions (P), engagement (E), relationships (R), meaning (M), and accomplishment (A). The current study explores Seligman's PERMA model as an organizing framework for measuring student well-being in a large sample of Australian adolescent students.

A need to focus on well-being in education

It is fair to argue that opportunities for the health, safety, educational progress, and moral development of youth are almost universally desired (Cohen, 2006; Land, Lamb, & Mustillo, 2001; Martens & Witt, 2004). Peterson (2006) contended that schools are ideal institutions to provide these opportunities and he called for schools to expand their focus beyond academic learning to also include the promotion of character and well-being.

The literature offers several reasons for adopting a positive education approach. Positive education provides an antidote to youth depression, serves as a pathway to increased life satisfaction, promotes learning and creativity, enhances social cohesion, and promotes civic citizenship (Seligman et al., 2009; Waters, 2011). Positive

education introduces and normalizes self-inquiry and self-management of one's mental health from a young age, which may lead to long-term benefits as youth move into adulthood with greater self-awareness and emotional intelligence (Waters, 2014). Further, the positive psychological characteristics developed through positive education have been linked to academic achievement, fewer risky behaviors, and better physical health in adulthood (Caprara, Barbaranelli, Pastorelli, Bandura, & Zimbardo, 2000; Durlak, Weissberg, Dymnicki, Taylor, & Schellinger, 2011; Hoyt, Chase-Lansdale, McDade, & Adam, 2012; Nidich et al., 2011; Wang, Haertel, & Walberg, 1997).

A multidimensional approach to well-being

Given these benefits of positive education, schools need to consider how to best build and support student well-being. In their official commissioned report to the French government, Stiglitz, Sen, and Fitoussi (2009) noted, 'what we measure affects what we do' (p. 7). But what should be measured? Beyond a simple positive–negative dichotomy, researchers in the field of positive psychology have suggested that well-being is best characterized as a profile of indicators across multiple domains, rather than as a single factor (Forgeard, Jayawickreme, Kern, & Seligman, 2011; Frey & Stutzer, 2010; Keyes, 2007; Lerner, Phelps, Forman, & Bowers, 2009; Organisation for Economic Co-operation and Development, 2014; Ryff & Keyes, 1995).

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There are both theoretical and practical reasons for approaching well-being as a multidimensional construct across valued life domains (Huppert & So, 2013). On the theoretical side, well-being is an abstract construct that includes both feeling good and functioning well (Huppert, 2014). Well-being cannot be defined by a single measure, but is comprised of various aspects that are more readily measured (Seligman, 2011). Unidimensional measures such as life satisfaction are strongly affected by a person's mood at the time, and ignore other aspects of well-being. In fact, multidimensional measures of well-being are only moderately correlated with life satisfaction (Huppert & So, 2013). Further, reducing measures to a unidimensional notion obscures potentially valuable information. For example, in a comparison across European countries, France and Spain scored similarly on overall well-being, but France scored high on engagement, moderately on competence, and low on self-esteem, whereas Spain scored moderately on engagement, low on competence, and high on self-esteem (Huppert & So, 2013).

In addition, positive constructs may differentially influence outcomes of interest. For example, a review of positive psychological well-being and cardiovascular outcomes found that optimism reliably predicted lower risk of cardiovascular disease and mortality, but findings were mixed for other aspects of well-being (Boehm & Kubzansky, 2012). Similarly, Diener and Chan (2011) noted that studies are needed to 'determine how the concepts are related to one another, and their independent ability to predict health outcomes beyond a general SWB factor score' (p. 27). Positive constructs are often highly correlated with one another, yet are studied independently (Friedman & Kern, 2014). Only by simultaneously considering multiple domains and taking into account factor inter-correlations can we see which factors drive observed associations.

On the practical side, multidimensional well-being metrics can identify groups with specific strengths and weaknesses. In education, overall grade point average indicates a student's overall achievement, but obscures the individual academic areas where students struggle. Report cards break down grades across subject areas, highlighting weak areas. Similarly, assessments of well-being need to go beyond global assessments to provide teachers and school counselors with specific information about domains in which students thrive or struggle. Some students may need to 'dial up' their sense of meaning whereas others might need to increase their positive emotions or improve social relationships.

Testing the PERMA model

To measure well-being as a multidimensional construct in positive education, Seligman's (2011) PERMA model has been proposed as a framework that could suitably assess dimensions that are valued by youth (e.g. positive emotions and relationships) whilst also aligning to existing school structures and strategies (Norrish, Williams, O'Connor, & Robinson, 2013; Waters, 2011; Waters, Barsky, & McQuaid, 2012; White & Murray, in press).

According to Seligman's (2011) model (see also Forgeard et al., 2011), *positive emotions* refer to hedonic feelings of happiness (e.g. feeling joyful, content, and cheerful). *Engagement* refers to psychological connection to activities or organizations (e.g. feeling absorbed, interested, and engaged in life). *Positive relationships* include feeling socially integrated, cared about and supported by others, and satisfied with one's social connections. *Meaning* refers to believing that one's life is valuable and feeling connected to something greater than oneself. *Accomplishment* involves making progress toward goals, feeling capable to do daily activities, and having a sense of achievement. Seligman (2011) advanced that these five pillars contribute to overall well-being, are important areas that people pursue for their own sake, and can be defined and measured independently of one another.

To date, there have been no empirical investigations of Seligman's PERMA model with adolescents. As there are currently no existing measures of PERMA for adolescents, existing data can be used to begin to build empirical support for the model. The aim of this paper was to explore whether the PERMA constructs could be measured as separate dimensions, using items from a well-being assessment conducted with a group of Australian adolescent students, thus providing an operational application of the PERMA theory within the education setting.

Seligman contends that the five PERMA domains fall on the positive side of the mental health spectrum; well-being is not simply the lack of negative psychological states, but is something more (Seligman & Csikszentmihalyi, 2000). To empirically test whether the PERMA factors were distinguishable from ill-being, we included negative emotions. Aligned with existing evidence (e.g. Cacioppo, Gardner, & Berntson, 1997; Watson, Clark, & Tellegen, 1988), we expected negative emotion to statistically be a separate factor from the five PERMA domains.

We tested cross-sectional associations between the well-being and self-reported measures of overall life satisfaction, physical vitality (i.e. feeling fit and strong), physical activity, school engagement, hope, somatic symptoms, and stressful life events. We expected a differential pattern of associations across the factors. However, as studies to date have not directly tested the five components together in a single model, we did not make specific hypotheses about the pattern of associations. Rather, we explored associations and begin to build the empirical foundation for more differentiated perspectives, which can be further tested in the future.

Method

Participants

Participants were recruited from St. Peter's College, Adelaide, Australia, a private Anglican boys school. This school has about 1300 students (age 3–18) and 230 teachers and staff. Students are mostly upper middle class with some indigenous students on scholarship,[1] and 73% speak English as their primary language. The current investigation included 516 male students in years eight through 11 (age 13–18). Students were relatively evenly distributed across the grades (year 8: 118 students; year 9: 116 students, year 10: 145 students; year 11: 134 students). About half the sample (49.6%) identified as non-religious, 21.5% Anglican, 14.3% Catholic, 5.4% Greek Orthodox, 2.5% Buddhist, 3.2% other religions, and 3.5% did not report religious affiliations.

Questionnaire development and assessment procedure

Students completed an extensive well-being questionnaire, which the school developed as part of an initiative to build student well-being. To develop the original questionnaire, students and pastoral staff were consulted to gain insight on what they wanted to know about their own well-being, using the appreciative inquiry 4-D technique (Cooperrider & Whitney, 2005). A list of relevant scales was compiled, and additional items were created to capture missing components. For instance, conversation with school staff suggested that given the school's Anglican tradition, questions focused on religion and spirituality were important to include. The resulting questionnaire was a comprehensive compilation of items and measures with student and staff input, aligned with contemporary well-being theory.[2]

Students in the Senior School were invited to complete the questionnaire online using SurveyMonkey software. Senior School Mentors managed data collection in their 30-min pastoral care groups over a four-day period at the same time each day. All data were treated as confidential. Analyses for the current study were conducted on de-identified data, and procedures were approved by the University of Pennsylvania Institutional Review Board.

Measures for the current study

For the purposes of the current study, we selected a subset of items from the broader questionnaire that we judged to be relevant to PERMA. To capture both positive and negative sides of well-being, we included negative emotion. All items were scaled on a five-point Likert scale, and higher scores indicate greater amounts of the given construct.

To operationalize PERMA, items were primarily drawn from two measures. The EPOCH Measure of Adolescent Well-being is a 20-item multidimensional measure of flourishing for youth currently under development, which assesses engagement, perseverance, optimism, connection to others, and happiness (Kern, Benson, Steinberg, & Steinberg, 2014). We included the 12 items from the engagement, perseverance, and connectedness subscales. The Positive and Negative Affect Schedule for Children (PANAS-C; Laurent et al., 1999) assesses 15 positive and 15 negative emotions felt over the past month; we included all 30 items. We also selected seven additional items that assessed meaning/purpose, daily accomplishment, and social support.

We examined cross-sectional associations with other scales included in the questionnaire. Overall well-being was assessed through the Satisfaction with Life Scale (Diener, Emmons, Larsen, & Griffin, 1985, 5 items, $\alpha = .85$).[3] The Children's Hope Scale (Snyder et al., 1997) assesses agency and pathways of hope (e.g. 'I think the things I have done in the past will help me in the future,' 6 items, $\alpha = .84$). The Gratitude Questionnaire (McCullough, Emmons, & Tsang, 2002) assesses stable tendencies to experience gratitude in daily life (e.g. 'I have so much in life to be thankful for,' 6 items, $\alpha = .71$). The Growth Mindset scale (Dweck, 2006) assesses the extent to which individuals believe their mindsets are fixed versus open to growth and experience (e.g. 'No matter how much intelligence you have, you can always change it quite a bit,' 6 items, $\alpha = .85$). The Healthy Pathways Child Report Scales (Bevans, Riley, & Forrest, 2010) are unidimensional scales that assess aspects of health, illness, and well-being in clinical and population-based research studies involving youth in transition from childhood to adolescence. The survey included the physical vitality (e.g. 'how often do you feel really healthy?' 4 items, $\alpha = .81$), somatic symptoms (e.g. 'how often do you have a headache?' 4 items, $\alpha = .72$), physical activity (e.g. 'How often do you play physically active games or sports?' 4 items, $\alpha = .84$), and school engagement (e.g. 'How often were you interested in the work at school?' 4 items, $\alpha = .83$) scales. Students noted whether 22 stressful life events had occurred over the past year (e.g. 'parents divorced or separated;' based on the Life Events Checklist, Brand & Johnson, 1982). Finally, the survey included eight items created by the school on spirituality (e.g. 'I believe there is a force for good in the Universe, guiding everything,' $\alpha = .94$).

Data analyses and results

Deriving the PERMA factors

Our first question was whether the PERMA factors could be empirically derived from the items included on the school's well-being questionnaire, as five correlated factors separate from negative emotion. We randomly split the sample into two equal halves ($n = 258$) to develop

and test the factor model. With the development sample, we performed principle components analyses with direct oblimin rotation ($\Delta = 0$), allowing correlated factors.[4] We examined the scree plot, the Kaiser criteria (using eigenvalues greater than 1.00 as a cut-off criteria), and Velicer's (1976) minimum average partial (MAP) test, which extracts factors until the average squared partial correlation of components is minimized. The screen plot suggested four to seven factors; nine eigenvalues were greater than 1.00, and the MAP test suggested five factors. We extracted four to nine factors and examined the interpretability of the factors and factor reliabilities (Cronbach's α). Six factors provided the clearest structure. Only four of the PERMA factors appeared: Positive emotion (13 items, $\alpha = .92$), Engagement (6 items, $\alpha = .70$), Relationships (9 items, $\alpha = .82$), and Accomplishment (6 items, $\alpha = .84$). The items reflecting Meaning ('I feel that my life has a purpose' and 'I generally feel that what I do in my life is valuable and worthwhile') loaded on the Relationships factor. Negative emotion split into two factors, which we labeled *Depression* (N_{dep}, 8 items; $\alpha = .90$) and *Anxiety* (N_{anx}, 7 items, $\alpha = .82$), based on the emotions comprising each factor.

With the test sample ($n = 258$), we next estimated confirmatory factor models using the lavaan package (version .5–16, Rosseel, 2012) in R (version 3.0.3). Model fit was primarily evaluated using the root mean square error of approximation (RMSEA) and the standardized root mean residual (SRMR). An RMSEA of .06 or lower combined with a SRMR of .09 or lower are considered acceptable (Hu & Bentler, 1999). Following recommendations by Kline (2005), we also report the χ^2 and comparative fit index (CFI). To provide support for the multidimensional structure, we compared a one-factor model (i.e. overall well-being with high positive and low negative items), a two-factor model (positive versus negative well-being), and the full six-factor model. Models were compared with the chi square difference test.

According to the RMSEA and SRMR, the six-factor model demonstrated acceptable fit (RMSEA = .058 [90% confidence interval = .054, .062], SRMR = .062, $\chi^2(1112) = 2058$, $p < .001$, CFI = .853), although the CFI and χ^2 were inadequate.[5] The model fit significantly better than the one-factor ($\Delta\chi^2(15) = 2029$, $p < .001$; RMSEA = .101 [.098, .105], SRMR = .119, $\chi^2(1127) = 4089$, $p < .001$, CFI = .541) and two-factor ($\Delta\chi^2(14) = 698$, $p < .001$; RMSEA = .075 [.072, .079], SRMR = .076, $\chi^2(1126) = 2757$, $p < .001$, CFI = .747) models. Factor reliabilities were consistent with the development set, except the Engagement factor was less reliable (P: $\alpha = .92$; E: $\alpha = .65$; R: $\alpha = .87$; A: $\alpha = .84$; N_{dep}: $\alpha = .89$; N_{anx}: $\alpha = .86$).

Combining the development and test samples, we estimated a final confirmatory model (RMSEA = .054 [.052, .057], SRMR = .058, $\chi^2(1112) = 2790$, $p < .001$, CFI = .860). The six-factor model fit better than the one-factor ($\Delta\chi^2(15) = 3867$, $p < .001$, RMSEA = .098 [.095, .100], SRMR = .116, $\chi^2(1127) = 6657$, $p < .001$, CFI = .538) and two-factor ($\Delta\chi^2(14) = 1,3853$, $p < .001$; RMSEA = .072 [.070, .075], SRMR = .072, $\chi^2(1126) = 4174$, $p < .001$, CFI = .746) models. Factors again demonstrated acceptable reliability (P: $\alpha = .92$; E: $\alpha = .68$; R: $\alpha = .85$; A: $\alpha = .84$; N_{dep}, $\alpha = .89$; N_{anx}, $\alpha = .84$). The final items and latent factor loadings are summarized in Table 1.

Exploring the PERMA nomological net

Composite scales were created from the well-being factor scores. Using the other scales included in the overall survey, we examined the pattern of correlations with the well-being factors. Table 2 summarizes descriptives for each scale and correlations with the well-being factors. The PERMA domains were positively correlated with one another ($r = .52–.65$), and Depression and Anxiety were positively correlated ($r = .68$). Correlations between the well-being and ill-being factors were weak to moderate (Depression: $r = -.16$ to $-.36$; Anxiety: $r = .01$ to $-.16$), further supporting the claim that well-being is not simply the lack of ill-being. As expected, the positive domains generally related to greater life satisfaction, hope, gratitude, school engagement, growth mindset, spirituality, physical vitality, and physical activity, whereas the negative domains related to more somatic symptoms and stressful life events.

We then examined associations between each well-being factor and the various scales and measures, controlling for the inter-correlation with the other well-being factors. Table 3 provides the partial correlations, and Table 4 summarizes the pattern of findings. Life satisfaction remained significantly correlated with Positive emotion, Relationships, and Accomplishment and less Depression. For health variables, Positive emotion and Accomplishment related to better physical activity and vitality, whereas Depression and Anxiety related to more somatic symptoms. Engagement related to greater school engagement. Hope was related to all factors except Depression. Gratitude was related to Positive emotion and Relationships. Spirituality was positively associated with Relationships and Depression. Stressful life events were related to Accomplishment (inversely) and Depression.

Discussion

The aim of this paper was to explore whether Seligman's (2011) PERMA model could be measured in a youth sample, thus providing an operational application of the PERMA theory within the field of positive education. The current exploratory study (1) examined whether the PERMA factors could be recovered from the items

Table 1. Final well-being factors and items with standardized latent factor loadings.

Scale and items	Loading
Positive emotion	$\alpha = .92$
How often have you felt cheerful?	.84
How often have you felt joyful?	.85
How often have you felt energetic?	.74
How often have you felt delighted?	.76
How often have you felt proud	.77
How often have you felt fearless?	.41
How often have you felt calm?	.52
How often have you felt happy?	.71
How often have you felt excited?	.64
How often have you felt active?	.68
How often have you felt daring?	.46
How often have you felt strong?	.60
How often have you felt lively?	.81
Engagement	$\alpha = .68$
When I am reading or learning something new, I often lose track of how much time passed	.59
I often get completely absorbed in what I am doing	.51
I get so involved in activities that I forget about everything else	.52
When I see beautiful scenery, I enjoy it so much that I lose track of time	.45
How often have you felt interested?	.62
How often have you felt alert?	.40
Relationships	$\alpha = .85$
My relationships are supportive and rewarding	.72
I actively contribute to the happiness and well-being of others	.60
I generally feel that what I do in my life is valuable and worthwhile	.68
When something good happens to me, I have people in my life that I like to share the good news with	.47
I have friends that I really care about	.58
There are people in my life who really care about me	.68
When I have a problem, I have someone who will be there for me	.66
I feel that I am loved	.65
I feel that my life has a purpose	.54
Accomplishment	$\alpha = .84$
I finish whatever I begin	.71
Once I make a plan to get something done, I stick to it	.73
I am a hard worker	.67
I keep at my schoolwork until I am done with it	.69
Most days I feel a sense of accomplishment from what I do	.68
During the past two weeks, I have been pleased about completing something that was hard to do	.65
Depression	$\alpha = .89$
How often have you felt miserable?	.80
How often have you felt sad?	.77
How often have you felt gloomy?	.77
How often have you felt lonely?	.76
How often have you felt upset?	.71
How often have you felt disgusted?	.52
How often have you felt blue?	.67
How often have you felt angry?	.67
Anxiety	$\alpha = .84$
How often have you felt nervous?	.47
How often have you felt scared?	.85
How often have you felt afraid?	.80
How often have you felt jittery?	.54
How often have you felt guilty?	.62
How often have you felt frightened?	.70
How often have you felt ashamed?	.60

Note: $N = 516$. Latent model estimated in R using the lavaan package (Rosseel, 2012). Model fit: RMSEA = .054 (90% confidence interval = .052, .057), SRMR = .058, CFI = .860.

Table 2. Scale descriptives and correlations with the well-being factors.

	N	Mean	SD	Min	Max	# items	α	P	E	R	A	N_{dep}	N_{Anx}
Positive emotion	516	3.63	0.67	1.00	5.00	11	.90	–					
Engagement	516	3.46	0.62	1.00	5.00	6	.68	.54**	–				
Relationships	516	4.01	0.61	1.00	5.00	10	.86	.65**	.55**	–			
Accomplishment	516	3.53	0.75	1.00	5.00	6	.84	.52**	.61**	.60**	–		
Depression	516	2.26	0.77	1.00	4.88	8	.89	−.32**	−.16**	−.36**	−.28**	–	
Anxiety	516	2.11	0.71	1.00	5.00	7	.84	−.16**	.01	−.19**	−.15**	.68**	–
Life satisfaction	516	3.58	0.81	1.00	5.00	5	.85	.61**	.43**	.64**	.55**	−.41**	−.20**
Hope	516	3.79	0.71	1.00	5.00	6	.84	.56**	.63**	.64**	.72**	−.32**	−.23**
Gratitude	516	3.84	0.63	1.67	5.00	6	.71	.52**	.44**	.67**	.46**	−.29**	−.14**
School engagement	516	3.04	0.77	1.00	5.00	4	.83	.45**	.55**	.44**	.56**	−.23**	−.07
Growth mindset	516	2.94	0.61	1.00	4.00	6	.85	.29**	.30**	.29**	.37**	−.19**	−.11*
Spirituality	516	2.46	1.13	1.00	5.00	8	.94	.18**	.23**	.32**	.25**	.03	.07
Somatic symptoms	516	2.09	0.81	1.00	5.00	4	.72	−.15**	−.10*	−.19**	−.13**	.43**	.37**
Physical vitality	516	3.62	0.81	1.00	5.00	4	.81	.58**	.32**	.44**	.39**	−.34**	−.23**
Physical activity	516	3.56	0.87	1.00	5.00	4	.84	.39**	.20**	.26**	.27**	−.14**	−.06
Life events	516	5.59	3.44	0	16	22	.69	−.07	−.01	−.08	−.13**	.41**	.25**

Note: # items = number of items included on the measure, α = Cronbach's α, P = positive emotion, E = engagement, R = relationships (with meaning items), A = accomplishment, N_{dep} = depression, N_{anx} = anxiety.
*p < .05; **p < .01.

Table 3. Partial correlations of well-being factors with other scales, partialing out the other well-being and ill-being factors.

	P	E	R	A	N_{dep}	N_{anx}
Life satisfaction	.28**	−.05	.29**	.20**	−.21**	.08
Hope	.10*	.27**	.22**	.44**	.03	−.16**
Gratitude	.10*	.06	.44**	.04	−.06	.02
School engagement	.11*	.25**	−.01	.27**	−.10*	.06
Growth mindset	.06	.07	.02	.18**	−.06	−.01
Spirituality	−.04	.03	.23**	.09	.10*	.04
Somatic symptoms	.01	−.05	−.03	.03	.23**	.14**
Physical vitality	.40**	−.04	.03	.09*	−.10*	−.05
Physical activity	.27**	−.05	−.02	.11*	−.03	.04
Life events	.04	.06	.06	−.09*	.34**	−.06

Note: Correlations partial out the other well-being and ill-being factors. P = positive emotion, E = engagement, R = relationships, A = accomplishment, N_{dep} = depression, N_{anx} = anxiety.
*p < .05; **p < .01.

Table 4. Summary of significant associations.

	P	E	R	A	N_{dep}	N_{anx}
Positive outcomes						
Life satisfaction	+		+	+	−	
Hope	+	+	+	+		−
Gratitude	+		+			
School engagement	+	+		+	−	
Growth mindset				+		
Spirituality			+		+	
Physical vitality	+		+		−	
Physical activity	+		+			
Negative outcomes						
Somatic symptoms					+	+
Stressful life events					−	+

Note: P = positive emotion, E = engagement, R = relationships, A = accomplishment, N_{dep} = depression, N_{anx} = anxiety, + = significant positive association with outcome (after controlling for other well-being and ill-being factors), − = significant negative association with outcome.

included on an existing well-being assessment, (2) examined if positive and negative factors could be distinguished, and (3) explored cross-sectional associations with other life, health, and mental health variables, mapping how different positive and negative constructs relate to one another.

The multidimensionality of well-being

Our results suggest that student well-being is multidimensional, on both the positive and negative sides of the mental health continuum. On the positive side, factors generally aligned to the PERMA model, with some exceptions. Based on the items included in the analysis, Positive emotion, Engagement, Relationships, and Accomplishment factors were recovered. Items theoretically reflecting Meaning overlapped with the Relationships items. This may be due to the items included in

the survey (e.g. there were only two relevant items, which may not have been strong enough to appear as a single factor), or it may reflect how Meaning appears in adolescence. Teenagers may gain meaning from their associations with other. Damon, Menon, and Bronk (2003) argue that for youth, purpose in life is different from meaning, and contains both a specific goal and an external component (i.e. the goal positively affects others). Similarly, Hill, Burrow, O'Dell, and Thornton (2010) found that adolescent definitions of purpose became more prosocial with increasing age. Future research should further elicit how Meaning evolves across adolescence.

A major premise of positive psychology is that well-being is not simply the lack of mental illness (e.g. Seligman & Csikszentmihalyi, 2000). Aligned with prior studies (e.g. Watson et al., 1988), separate positive and negative factors appeared. Notably, just as we found evidence for multiple well-being factors, there were also multiple ill-being factors, reflecting sadness/depression and anxiety. Although both factors were correlated negatively with positive outcomes and positively with negative outcomes (i.e. somatic symptoms and stressful life events), associations were primarily driven by the Depression factor in the controlled model.

Exploring the nomological net of well-being

We explored cross-sectional associations with other well-being, life, and health variables included in the overall survey, beginning to map the nomological net underlying various well-being constructs. As might be expected, univariate correlations indicated that the well-being factors were generally positively correlated with other scales and measures. Well-being factors are often studied independently, and it is unknown what might be driving associations that we see. By controlling the overlapping variance, we observed the unique contribution of each factor to each correlate.

Positive emotion, assessed by reported feelings experienced over the past few weeks, was generally associated with many of the outcomes, including life satisfaction, hope, gratitude, school engagement, physical vitality, and physical activity. Growing evidence finds associations between positive emotions and other positive outcomes, including job success, good relationships, and better health (e.g. Howell, Kern, & Lyubomirsky, 2007; Lyubomirsky, King, & Diener, 2005). Huppert and So (2013) suggest that positive emotion is a core part of flourishing, and our pattern of results support this claim.

Engagement has been defined in various ways, including psychological interest, behavioral involvement, and concentration/focus (Appleton, Christenson, & Furlong, 2008). As captured by the items in the survey, Engagement reflected absorption and interest. As might

be expected, psychological interest related to greater commitment to and engagement in school. It is also related to a greater sense of hope. Engagement may reflect an active approach to life, and should remain a focal area of research.

Relationships, defined in terms of feeling connected to, supporting, and being supported by others, related to greater life satisfaction, hope, gratitude, and spirituality. Our findings align with the growing body of literature demonstrating the benefits of maintaining positive relationships with others (Taylor, 2011).

Accomplishment is often defined in terms of objective achievement, such as awards or honors received and competitions won, especially in the academic environment. The survey captured subjective achievement. Some items reflected perseverance, which has been related to numerous positive outcomes, including academic and career success, good marriages, life satisfaction, and health (Roberts, Kuncel, Shiner, Caspi, & Goldberg, 2007). Other items reflected mastery, which self-determination theory suggests is a primary human need, closely tied to well-being (Deci & Ryan, 2000). Even after controlling for the other well-being factors, Accomplishment consistently related to other correlates, including life satisfaction, hope, school engagement, growth mindset, physical vitality, and physical activity. Objective achievement is important for schools to demonstrate, and subjective accomplishment might be an important predecessor, reflecting a process of actively working toward goals.

Practical implications

We suggest that multidimensional measures to well-being are practically useful in schools. Global measures leave little guidance on how to increase a student's level of well-being, whereas the greater specificity provided by the PERMA domains offers more information to allow teachers to better meet the well-being needs of students or classes. For example, in Australia, students begin secondary schooling in year seven. The large intake of new students from different elementary schools means that many do not know each other. If this group of students scores low on social relationships, the school can set up school buddy–peer programs or senior–junior student mentoring opportunities. By level nine and ten, students may be doing well on relationships but report low engagement (Eccles et al., 1993; Ryan & Patrick, 2001). Redesigning lessons and the learning context to make school more engaging in these year levels could help boost well-being at that time. By the final years, focus may be more on building meaning and accomplishment. Thus, a multidimensional approach to well-being allows schools to tailor systematic well-being approaches to the developmental needs of students (White & Waters, 2014).

Limitations

Several limitations must be acknowledged. First, as a cross-sectional study, causal interpretation, directional interpretations, and overall conclusions are limited. For instance, although positive emotions related to greater physical activity, it may be that physical activity leads to greater positive emotion. Future longitudinal research is needed to tease apart the direction of effects. Second, all data were self-reported. Ideally, we would have included actual school achievement as an outcome, but such information was unavailable. Future assessments will benefit from linking self-reported well-being to objective outcomes, such as health records, grades, and test scores. Third, we focused specifically on Seligman's (2011) PERMA model. Other theoretical models need to be tested to provide support for the idea that well-being is best measured as a multidimensional construct in youth samples.

Finally, as a private boys' school, the sample was relatively homogenous, and care should be taken in generalizing findings to other population groups. The school has a strong academic focus, has recently embraced well-being as a new strategic goal, and is especially supportive of evidence-based approaches. Other schools with differing values may be more or less receptive to incorporating well-being assessments into existing practices. Still, even if the measures or factors differ, or if there are challenges involved, we believe that multidimensional well-being metrics are worth the effort and will have a positive impact on the students and the school as a whole.

Conclusion: a vision for a positive future

Most children and adolescents spend much time in the school environment; as such, schools play a critical socialization role in establishing and maintaining positive cultural values and promoting well-being for today's youth. Educational outcomes are typically determined by objective tests and academic records, but subjective and multidimensional perspectives of well-being are equally informative in assessing the degree to which schools are serving their purpose to prepare students for adulthood. By directly measuring subjective perspectives of well-being across multiple domains, there is potential to more successfully promote student well-being. The current exploratory study suggests that Seligman's (2011) PERMA framework has applicability within the field of positive education.

Notes

1. According to the Australian Index of Community Socio-educational Advantage (2012), which summarizes data on family background, parental occupation, and educational attainment, the school rated 1176 in 2012 compared to a national average of 1000.
2. Contact Dr Mathew White (mwhite@stpeters.sa.edu.au) for the complete questionnaire.
3. The survey included the adult version, rather than the more age-appropriate Satisfaction with Life Scale Adapted for Children (Gadermann, Schonert-Reichl, & Zumbo, 2010). Reliabilities in our sample were consistent with the Gadermann et al. study ($\alpha = .86$), but this limitation should be kept in mind when considering variable relations.
4. Before conducting our analyses, we verified the factorability of the items with the development set, which was supported by both the Kaiser-Meyer-Olkin measure of sampling adequacy (.90) and Bartlett's test of sphericity ($\chi^2(1112) = 6383$, $p < .0001$).
5. CFI can have a downward bias when factors are strongly correlated, as they were here; χ^2 is affected by sample size such that with large samples, even small differences can make it significant (Prudon, 2012). Although it would be preferable for all fit indices to show good fit, the model was significant according to Hu and Bentler's (1999) RMSEA and SRMR criteria. As such, we chose to proceed with the model.

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