

Bidimensional Emotional Health in College Students: a Comparison of Categorical and Continuous Analytic Approaches

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Abstract This study reports on an investigation of the concurrent validity of the bidimensional model of emotional health, using two analytic approaches—one categorical and the other continuous—with two subsamples of college students. Results from the categorical approach, using analyses of variance with the first subsample ($n = 461$), indicated that, compared to isolated emotional wellbeing and distress models, the bidimensional model of emotional health had incremental validity in relation to social connectedness, life satisfaction, physical health, and academic achievement outcomes. Findings from the continuous approach, using latent-variables path analyses with the second subsample ($n = 490$), indicated that the isolated emotional wellbeing model was a better predictor of the aforementioned quality-of-life outcomes than were the bidimensional and isolated distress models. Taken together, findings from both sets of analyses suggest that emotional wellbeing is a distinguishing predictor of college student outcomes. Implications for the theory and practice of mental health work at the college level are discussed.

Keywords Bidimensional emotional health · Two-continua mental health · Dual-factor mental health · Wellbeing · Distress · Emotion

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Concern for college students' wellbeing has grown over the last decade, as mental health problems among this population appear to be on the rise (Gallagher 2007; Kitzrow 2003). Given that approximately half of young adults attend post-secondary schools, and that the onset of mental health problems often occurs in young adulthood (Kessler et al. 2005), there is ample evidence to warrant an increased focus on assessing and promoting college students' wellbeing. Moreover, given that mental health problems have been negatively associated with various educational, economic, and social outcomes (Andrews and Wilding 2004; Mowbray et al. 2006), it is reasonable to posit that enhancing the wellbeing of college students is likely to improve both their individual quality of life as well as the collective quality of life of the communities they inhabit, in the present and the future. That said, prior to undertaking large-scale efforts to assess and promote college students' wellbeing, there are a few foundational issues that warrant clarification via empirical investigation. One such issue is how to best conceptualize college students' mental health—as conceptualization shapes methodological operationalization, which, in turn, determines ground-level implementation of services.

Traditionally, mental health has been conceptualized using a unidimensional model, which is characterized by assessing the presence or absence of psychopathology. Within this model, individuals with higher levels of symptoms are considered to have, by default, poorer wellbeing. In recent years, however, an alternative view of mental health has challenged this unidimensional model, calling for an expanded framework that integrates psychopathology, symptoms, and risk indicators with positive-psychological or wellbeing indicators, such as interpersonal strengths, enjoyable emotions, and life satisfaction (Keyes 2005; Seligman and Csikszentmihalyi 2000). This more expansive and integrative model, which we refer to herein as the *bidimensional model of mental health*—and

which others have called the *dual-factor model* (e.g., Suldo and Shaffer 2008) or *two-continua model* (e.g., Westerhoff and Keyes 2010)—conceptualizes psychopathology and wellbeing as two related-yet-distinct dimensions of human functioning, both important in their own right.

Instead of conceptualizing persons as either more-or-less psychologically distressed or psychologically well, which are the bipolar ends of the unidimensional model of mental health, the bidimensional model of mental health allows for persons to be conceptualized as both more-or-less distressed in some regards, while being simultaneously considered more-or-less well in other regards. The upshot of this approach is that the bidimensional model permits, at least theoretically, the possibility of mixed mental health outcomes. Thus, instead of only two, mutually-exclusive global classifications (i.e., mentally healthy or mentally unhealthy), the bidimensional model allows for a range of possible mental health classifications, depending on where an individual's functioning manifests within the psychopathology and wellbeing dimensions (e.g., mentally healthy, asymptomatic yet discontent, symptomatic yet content, or mentally unhealthy; Renshaw & Cohen 2014). The viability of such mixed mental health outcomes has been suggested by studies in other fields of inquiry, with findings indicating that people often lead pleasant and meaningful lives while still presenting with debilitating psychological symptoms (e.g., Davidson et al. 2009).

To date, several empirical studies have attempted to establish the bidimensional model of mental health by investigating its concurrent and predictive validity with various samples, drawn from child, adolescent, college-student, and adult populations. Findings from such studies have indicated that adults with low levels of psychological wellbeing are more than six times as likely as those with high levels of wellbeing to develop clinical-level symptoms for at least one psychological disorder (Keyes et al. 2010), and that while older adults self-report fewer symptoms of psychological distress than younger adults, they do not necessarily endorse greater psychological wellbeing than their counterparts (Westerhoff and Keyes 2010). Regarding college students, validation studies of the bidimensional mental health model have indicated that students who reported low levels of emotional symptoms paired with high levels of life satisfaction were more likely to report lower levels of alcohol use and fewer attention problems, while endorsing greater levels of hope, gratitude, and grit, compared to students who reported low levels of both symptoms and life satisfaction (Eklund et al. 2011). And another study found that life satisfaction, when considered in conjunction with emotional symptoms, served as a distinguishing indicator of college students' quality of life—with students in the symptomatic-yet-content group reporting significantly greater levels of social connectedness and perceptions of physical health, compared with students in both the mentally-unhealthy and asymptomatic-yet-discontent groups

(Renshaw & Cohen 2014). Taken together, findings from these studies, along with others examining the applicability of the bidimensional model with youth (e.g., Suldo et al. 2011), suggest that psychopathology and wellbeing are related-yet-distinct dimensions of human functioning that can be investigated, in tandem, to provide a more robust representation of mental health and its relations with quality-of-life outcomes.

To date, all previous studies investigating the bidimensional model of mental health have operationalized this model via a categorical schema, which is characterized by groups of participants who self-report either (a) average-to-high levels of subjective wellbeing paired with low levels of psychopathology, (b) low levels of subjective wellbeing accompanied by low levels of psychopathology, (c) average-to-high levels of subjective wellbeing paired with at-risk-to-clinical levels of psychopathology, or (d) low levels of subjective wellbeing accompanied by at-risk-to-clinical levels of psychopathology. Suldo and Shaffer (2008) as well as Suldo et al. (2011) labeled these four groups as follows: *complete mental health*, *vulnerable*, *symptomatic but content*, and *troubled*. Eklund et al. (2011) labeled these groups differently: *well-adjusted*, *at-risk*, *ambivalent*, and *distressed*. Moreover, Renshaw and Cohen (2014) relabeled these groups like so: *mentally healthy*, *asymptomatic yet discontent*, *symptomatic yet content*, and *mentally unhealthy*. To create such groupings, each study used differing operationalizations of psychopathology, while using the same, single construct—life satisfaction—to operationalize subjective wellbeing. Although intuitively appealing, use of a single indicator to represent the entire dimension of psychological wellbeing has been criticized as a likely case of construct underrepresentation (Renshaw & Cohen 2014).

Given that applied mental health work typically requires classification, based on assessment findings, as a prerequisite for treatment, the four-group categorical schema employed in previous investigations of the bidimensional model of mental health is likely to be user-friendly for both practitioners and applied researchers. That said, some scholars have expressed concerns about this approach, noting that “the use of categorical analyses can mask much of the complexity that marks the interrelations among psychopathology and subjective well-being” (Doll 2008, p. 71), and have called for the use of research questions, designs, and analyses that utilize data from continuous variables (Renshaw & Cohen 2014). Relatedly, concerns have also been raised regarding how psychopathology has been operationalized in previous studies of the bidimensional model, as measures of internalizing symptoms (e.g., depressive thoughts and anxious feelings) and externalizing symptoms (e.g., impulsive and aggressive behaviors) have often been conflated, notwithstanding the fact that they are conceptually and empirically distinct.

Considering the limitations of previous studies investigating the bidimensional model of mental health, the purposes of the present study were threefold. First, this study intended to further this line of research by evaluating the concurrent validity of the bidimensional model via two comparative approaches: one employing categorical data analyses and the other utilizing continuous data analyses. Second, this study aimed to refine the operationalization and theoretical coherence of subjective wellbeing within these analyses by adopting a temporal conception of emotional wellbeing, operationalized as positive affect in relation to the past (i.e., gratitude), present (i.e., engagement), and future (i.e., optimism). This temporal conception is analogous to the more general construct of *positive affectivity*, which has been defined as an individual's "disposition to experience positive emotional states" (Watson and Naragon 2009, p. 207). The intention of using these three sub-indicators to represent subjective wellbeing instead of using the single generalized indicator of life satisfaction (as has been done in previous research in this line of inquiry; e.g., Renshaw and Cohen 2014) was to operationalize wellbeing in a parallel fashion to how psychopathology was operationalized in previous studies within this area. As mentioned above, all previous studies in this line of inquiry have used multiple measures targeting specific problem behaviors to ultimately derive a composite psychopathology classification variable to use within the bidimensional mental health model. In this present study, gratitude, engagement, and optimism were used for a functionally similar purpose: to derive a composite representation of subjective wellbeing via component indicators. This methodological decision was also made to rule-out potential confounding factors in the nature of the predictor variables used to represent wellbeing and psychopathology, ensuring that differences in predictive power observed between models could not be attributable to differences in the scope of the constructs used to represent wellbeing and psychopathology, which was a major limitation in previous studies within this line of work (Eklund et al. 2011; Renshaw and Cohen 2014).

Finally, this study also intended to refine the theoretical coherence of psychopathology within these analyses—moving away from conflating internalizing and externalizing symptoms—by focusing solely on common affective symptoms, operationalized as depression, anxiety, and stress. Thus, instead of attempting to investigate the whole of bidimensional mental health, the present study aimed to investigate only one of its sub-phenomena: bidimensional emotional health. Based on findings from previous research in this line of inquiry, we hypothesized that findings from both the categorical and continuous analytic approaches would provide concurrent validity evidence favoring the bidimensional model of emotional health over the unidimensional models of emotional wellbeing and distress—yielding greater predictive power, characterized by larger effect sizes, in relation to

several valued college student outcomes: academic achievement, physical health, social connectedness, and life satisfaction. Although life satisfaction was conceptualized as a predictor variable in previous studies within this line of inquiry (e.g., Renshaw and Cohen 2014; Suldo and Shaffer 2008), it was conceptualized as an outcome variable in the present study given that the broader base of positive psychology research (outside of the bidimensional mental health literature) positions life satisfaction as a generalized wellbeing outcome that is a function of various contextual conditions and patterns of temporally-bound affective experiences, such as those represented by the three more particular wellbeing indicators selected in the present study (e.g., Oishi et al. 1999; Plicher 1998).

Method

Participants

The present sample consisted of 951 undergraduate college students attending a large, public university located in the southern region of the United States. For data analysis purposes, the initial sample was split into two approximately equal subsamples using the random-sampling procedure in SPSS version 20. Subsample 1 (S1) consisted of 48 % of the original sample ($n = 461$), while Subsample 2 (S2) consisted of the remaining 52 % ($n = 490$). Participants in both subsamples were predominantly female (S1 = 72 %, S2 = 75 %) and had a mean age of 20 years ($SD = 1.6$; range = 18–29). The majority of participants in both subsamples self-identified as White/Caucasian (S1 = 79 %, S2 = 78 %), with far fewer identifying as Black/African American (S1 = 11 %, S2 = 13 %), Hispanic/Latino (S1 = 4 %, S2 = 2 %), Asian/Pacific Islander (S1 = 3 %, S2 = 4 %), and other ethnicities (S1 = 3 %, S2 = 3 %). Both subsamples contained students who were in various years of enrollment at the university, with first-year students being the most prevalent (S1 = 33 %, S2 = 36 %), followed by second-year (S1 = 26 %, S2 = 23 %), third-year (S1 = 26 %, S2 = 23 %), and then fourth-or-more-year students (S1 = 15 %, S2 = 18 %).

All participants were recruited via an online research management system administered by the university's Department of Psychology, which was only accessible to students enrolled in undergraduate psychology courses. Participation in the study was open to all undergraduates who were at least 18 years of age and was not restricted by academic major, physical health, mental health, or any other personal characteristics. Each participant used a secure online server to complete the survey, which consisted of a series of demographics questions followed by various self-report surveys (see the [Measures](#) section, below), and each received partial course credit for participation in the study. Approval from the

university's Institutional Review Board was obtained prior to beginning the study, and informed consent was acquired for all participants prior to their completion of the online survey.

Measures

Gratitude Questionnaire–6 (GQ–6) The GQ–6 is a 6-item measure for assessing dispositional gratitude (McCullough et al. 2002). Four of its items are worded positively (e.g., “I have so much in life to be grateful for”), while the other two are phrased negatively (e.g., “When I look at the world, I don't see much to be grateful for”) and were thus reverse-scored. All items are arranged on a seven-point response scale (1 = *strongly disagree*, 2 = *disagree*, 3 = *slightly disagree*, 4 = *neutral*, 5 = *slightly agree*, 6 = *agree*, 7 = *strongly agree*). Research has shown that the GQ–6 has strong internal reliability, a unitary factor structure, and concurrent validity with a variety of emotionality and personality variables (McCullough et al. 2002, 2004). The internal reliability of this measure with the present samples was adequate (S1 $\alpha = .76$, S2 $\alpha = .71$).

Revised Life Orientation Test (LOT–R) The 6-item LOT–R was used to assess dispositional optimism (Scheier et al. 1994). Three of its items are phrased positively (e.g., “In uncertain times, I usually expect the best”), while the other three are phrased negatively (e.g., “I hardly ever expect things to go my way”) and were thus reverse-scored. All items are arranged along a five-point response scale (0 = *strongly agree*, 1 = *disagree*, 2 = *neutral*, 3 = *agree*, 4 = *strongly agree*). The original measure also included 4 filler items (e.g., “It is easy for me to relax”), which were not used in the present study. The LOT–R has been shown to have acceptable internal consistency, moderate to strong test–retest reliability, a unitary factor structure, and concurrent validity with various personality, emotionality, and performance variables (Andersson 1996; Scheier et al. 1994). The internal reliability of this measure with the present samples was strong (S1 $\alpha = .80$, S2 $\alpha = .81$).

Positive and Negative Affect Schedule (PANAS) The PANAS is a 20-item measure consisting of two subscales, one assessing global positive affect and the other global negative affect (Watson et al. 1988). Each subscale consists of 10 feeling words (e.g., “interested,” “irritable,” “attentive,” and “ashamed”) and respondents rate the degree to which they experienced each during the past week, using a five-point response scale (1 = *not at all*, 2 = *a little*, 3 = *moderately*, 4 = *quite a bit*, 5 = *extremely*). Studies have demonstrated that the PANAS subscales have strong internal consistency, moderate to strong test–retest reliability, concurrent validity with each other as well as other measures of emotionality, and that the overall measure has a bidimensional factor structure (Crawford and Henry 2004; Watson et al. 1988). The global

positive affect subscale (PANAS-P) was used in the present study to represent desirable present-moment emotional engagement during the past week. The internal reliability of this particular scale with the present samples was strong (S1 $\alpha = .89$, S2 $\alpha = .88$).

Depression–Anxiety–Stress Scale–21 (DASS–21) The DAS–21 is composed of three subscales, assessing depression, anxiety, and stress, which are considered to be the most common clusters of affective symptoms (Antony et al. 1998). Each subscale consists of 7 items (e.g., “I felt that I had nothing to look forward to,” “I was worried about situations in which I might panic and make a fool out of myself,” and “I found it hard to wind down”) and response options are arranged on a four-point scale (0 = *did not apply to me*, 1 = *applied to me some of the time*, 2 = *applied to me a good part of the time*, 3 = *applied to me most of the time*). The DAS–21 subscales have been shown to have strong internal reliability and convergent validity with each other and with other measures of affective symptoms (Antony et al. 1998; Page et al. 2007). The internal reliability of these scales with the present samples was strong (S1 α range = .87–.88, S2 α range = .86–.89).

Revised UCLA Loneliness Scale (LS–R) The 20-item LS–R was used to assess social connectedness (Russell et al. 1980). Half of its items are worded negatively (e.g., “I lack companionship”), while the other half are positively phrased (e.g., “I feel in tune with the people around me”), and all items are arranged along a four-point response scale (1 = *never*, 2 = *rarely*, 3 = *sometimes*, 4 = *often*). Although the positive items are typically reverse-scored to generate an overall loneliness score, for the purposes of this study the negative items were reverse-scored to generate a social connectedness score. Research has demonstrated that the LS–R has excellent internal and test–retest reliability as well as concurrent validity with emotionality, personality, and other relationship and social behavior variables (Russell 1996; Russell et al. 1980). The internal reliability of this measure with the present samples was very strong (S1 $\alpha = .94$, S2 $\alpha = .93$).

Satisfaction with Life Scale (SLS) The 5-item SLS was used to assess global life satisfaction (Diener et al. 1985). All items are worded positively (e.g., “The conditions of my life are excellent”) and response options are arranged on a seven-point scale (1 = *strongly disagree*, 2 = *disagree*, 3 = *slightly disagree*, 4 = *neither agree nor disagree*, 5 = *slightly agree*, 6 = *agree*, 7 = *strongly agree*). The SLS has been shown to have strong internal and test–retest reliability, a unitary factor structure, and concurrent validity with other emotional wellbeing measures (Diener et al. 1985; Pavot and Diener 1993). The internal reliability of this measure with the present samples was strong (S1 $\alpha = .90$, S2 $\alpha = .88$).

Perception of Physical Health (PPH) Participants' physical health quality was assessed via a single self-perception item, "How would you describe your physical health?," which was created for the purposes of this study and arranged along a 5-point response scale (1 = *excellent*, 2 = *very good*, 3 = *good*, 4 = *fair*, 5 = *poor*). A substantive body of research has shown that both positive and negative emotional states have been significantly associated with self-perceptions of physical health, suggesting that emotional wellbeing may function as a protective factor against physiological symptoms and that emotional distress is likely comorbid with physical health problems (Salovey et al. 2000).

Academic Achievement Participants' overall academic achievement was assessed via self-reported grade-point average (GPA). Given that standardized testing initiatives that crosscut academic majors are rare at the undergraduate level, GPA was thus conceptualized as the most objective indicator of college students' academic achievement. As an artifact of the university's grading standards, students' potential GPAs ranged from 0 (indicating all *F*, or non-passing, grades) to 4 (indicating all *A*, or high-passing, grades). Previous research has indicated that college students' GPA is significantly, negatively associated with emotional distress and significantly, positively correlated with emotional wellbeing, albeit at levels characterized by small effect sizes (Richardson et al. 2012).

Research Design

The present study utilized a cross-sectional, correlational research design. This overarching design was parsed into two sub-designs: one using the categorical method employed in previous studies of the bidimensional model of mental health (with Subsample 1), and the other using data from continuous variables to indicate latent bidimensional emotional health variables (with Subsample 2). In the categorical design, participants were classified into one of four possible emotional-health-status groups, based on standardized meta-composite scores derived from their responses to the respective self-report measures. In the continuous variable design, no groupings or standardized composite scores were used; rather, the raw composite scores from the self-report measures were used as indicators of the latent constructs of emotional distress and emotional wellbeing, which, modeled together, represented the latent relation of bidimensional emotional health. Although the independent variables for both research designs differed (i.e., emotional-health-status groupings compared to latent-emotional-trait relations), the self-reported dependent variables for both were the same: life satisfaction, social connectedness, physical health, and academic achievement. Each of these dependent variables was conceptualized as representing an important quality-of-life outcome that was

hypothesized to be predicted by participants' bidimensional emotional health.

Data Analyses

Categorical Analytic Approach Prior to conducting the primary categorical analyses with Subsample 1, exploratory factor analyses (EFA) were conducted to investigate the dimensionality of the DASS-21, which was hypothesized to represent three emotional distress constructs (i.e., depression, anxiety, and stress), as well as the dimensionality of the pooled items from the GQ-6, PANAS-P, and LOT-R, which was hypothesized to represent three emotional wellbeing constructs (i.e., gratitude, engagement, and optimism). Furthermore, to understand the nature and distribution of the primary variables in this subsample—and to check the data's goodness-of-fit with the statistical assumptions of the intended primary analyses—descriptive statistics, bivariate correlations, and internal reliability coefficients were calculated. Following the vetting of the primary variables, participants were classified into one of four possible emotional-health-status groups using standardized meta-composite scores. Given that the subscales used to create the emotional distress and wellbeing composites consisted of differing numbers of items with varying response-option scales, all raw subscale composite scores were first transformed into z -scores, then these standardized subscale composite scores were summed together to create standardized meta-composite scores for emotional distress ($\text{depression}_z + \text{anxiety}_z$) and wellbeing ($\text{gratitude}_z + \text{engagement}_z + \text{optimism}_z$). Using these standardized meta-composite scores, each participant was then classified as having either *low-to-moderate* range (standardized meta-composite score ≤ 1 *SD*) or *at-risk-to-clinical* range (standardized meta-composite score > 1 *SD*) emotional distress, and as having either *languishing-to-low* range (standardized meta-composite score < -1 *SD*) or *moderate-to-flourishing* range (standardized meta-composite score ≥ -1 *SD*) emotional wellbeing. These classifications were then considered together to assign participants to one of four possible bidimensional emotional-health-status groups: (1) *healthy emotionality* (low-to-moderate range distress paired with moderate-to-flourishing range wellbeing), (2) *unhealthy emotionality* (at-risk-to-clinical range distress paired with languishing-to-low range wellbeing), (3) *mixed emotionality* (at-risk-to-clinical range distress paired with moderate-to-flourishing range wellbeing), and (4) *diminished emotionality* (low-to-moderate range distress paired with languishing-to-low range wellbeing). This classification method was modeled after that used in previous studies in this line of work (e.g., Renshaw & Cohen 2014) for the purpose of making findings comparable across a series of studies using similar categorization criteria.

Following these preliminary analyses, the primary categorical analyses were conducted, consisting of a series of univariate, between-subjects analyses of variance (ANOVA) with Subsample 1. The independent variable for the first set of ANOVA was emotional wellbeing status, which consisted of two levels (i.e., languishing-to-low range or moderate-to-flourishing range), while the dependent variables were four quality-of-life outcomes: life satisfaction, social connectedness, physical health, and academic achievement. The independent variable for the second set of ANOVA was emotional distress status, which also consisted of two levels (i.e., low-to-moderate range or at-risk-to-clinical range), while the dependent variables were the same. The independent variable for the third and final set of ANOVA was bidimensional emotional health status, which consisted of four levels (i.e., healthy, unhealthy, mixed, and diminished emotionality), while the dependent variables were again the same. Following each set of ANOVA, a series of planned comparisons were conducted to investigate the differential effects between selected bidimensional emotional-health-status groups (i.e., healthy–unhealthy, healthy–diminished, and mixed–unhealthy) across the quality-of-life outcomes. All preliminary and primary categorical analyses were conducted using SPSS version 20.

Continuous Analytic Approach Before conducting the primary continuous analyses with Subsample 2, confirmatory factor analyses (CFA) were conducted on the revised scales (derived from the EFA findings with Subsample 1) to confirm the dimensionality of the variables of interest. Likewise, to understand the nature and distribution of the primary study variables—and to check the data’s goodness-of-fit with the statistical assumptions of the intended primary analyses—descriptive statistics and internal reliability coefficients were calculated. Following these preliminary analyses, the primary continuous analyses were conducted, consisting of a series of latent-variable path analyses (LVPA). The first LVPA (Model 1) tested the latent variable of emotional distress, indicated by the observed variables of depression and anxiety, as a predictor of the four observed quality-of-life outcomes: life satisfaction, social connectedness, physical health, and academic achievement. The second LVPA (Model 2) tested the latent variable of emotional wellbeing, indicated by the observed variables of gratitude, engagement, and optimism, as a predictor of the same observed quality-of-life outcomes. The third and final LVPA (Model 3) combined the previous two models, correlating the latent variables of emotional wellbeing and emotional distress and then using them as co-predictors of the same observed quality-of-life outcomes. All preliminary and primary continuous analyses were conducted using AMOS version 20.

Results

Preliminary Analyses

Categorical Approach The original EFA conducted with Subsample 1 using items from the DASS–21 yielded four factors with eigenvalues >1 . Inspection of the scree plot and results from the parallel analysis, however, both suggested a two-factor solution. Thus, two-, three-, and four-factor solutions were further explored. Following inspection of the pattern matrices yielded by these potential solutions, the intercorrelations of the resulting factors for each solution, and the item-content of each factor indicated by each solution, the two-factor solution was identified as the most reasonable model—as it had the best data–model fit and minimized the number of high cross-loading items, while maintaining conceptual coherence. The final EFA model dropped the two cross-loading items (i.e., 11 and 18), resulting in a revised 19-item measure (DASS–19) that was characterized by two moderately-correlated ($r = .66$) affective symptom factors: depression (items: 3, 5, 10, 13, 14, 16, 17, 21; item-loadings = .37–.86) and anxiety (items: 1, 2, 4, 6, 7, 8, 9, 12, 15, 19, 20; item-loadings = .39–.77).

Similarly, the original EFA conducted with Subsample 1 using the 22 pooled items from the GQ–6, PANAS–P, and LOT–R also yielded four factors with eigenvalues >1 ; however, inspection of the scree plot and findings from the parallel analysis both suggested a three-factor solution. As a result, both three- and four-factor solutions were further explored. Using the same decision-rules noted with the previous EFA, the three-factor solution was ultimately identified as the best-fitting model. The final EFA solution dropped the one non-loading item (i.e., item 6 of the GQ–6), resulting in 21 items representing three moderately-correlated factors ($r = .46$ –.60), which mapped directly onto their original parent scales: gratitude (five items [GQ–5]; item-loadings = .53–.95), engagement (10 items [PANAS–P]; item-loadings = .57–.74), and optimism (six items [LOT–R]; item-loadings = .44–.77). Moreover, Table 1 presents the descriptive statistics and reliabilities for all primary variables in the categorical analyses. Given the observed distributions and internal consistency of the variables of interest, all intended primary analyses were deemed appropriate.

Table 2 presents the results from bivariate correlations (Pearson’s r) conducted with Subsample 1 using all variables of interest. These findings indicated significant, moderate positive relations between emotional distress variables (i.e., depression and anxiety); significant, moderate positive relations among emotional wellbeing variables (i.e., gratitude, optimism, and engagement); significant, small-to-moderate negative relations between emotional distress and wellbeing variables; significant, small-to-moderate negative relations between emotional distress variables and the quality-of-life

Table 1 Descriptive statistics of primary study variables: Subsamples 1 and 2

Construct	Scale	# Items	S	Min., Max.	M	SD	Skewness	Kurtosis	α
Depression	DASS–19–D	8	1	0, 21	5.10	4.54	.92	.01	.88
			2	0, 21	5.10	4.66	1.23	1.12	.89
Anxiety	DASS–19–A	11	1	0, 29	8.10	5.81	.96	.75	.87
			2	0, 29	8.88	6.00	.57	–.21	.86
Gratitude	GQ–5	5	1	14, 35	31.90	3.45	–1.73	3.69	.76
			2	14, 35	31.76	3.60	–1.62	3.19	.71
Optimism	LOT–R	6	1	2, 24	14.52	4.22	–.37	–.19	.80
			2	2, 24	14.38	4.19	–.25	.00	.81
Engagement	PANAS–P	10	1	16, 50	35.66	7.20	–.29	–.35	.89
			2	14, 50	35.06	7.35	–.23	–.34	.88
Social Connectedness	LS–R	20	1	28, 80	65.59	11.14	–.92	.15	.94
			2	31, 80	65.50	10.78	–.77	–.15	.93
Life Satisfaction	SLS	5	1	5, 35	24.69	6.66	–.53	–.39	.90
			2	5, 35	25.43	6.24	–.64	–.05	.88
Academic Achievement	GPA	1	1	1, 4	3.03	.54	–.54	.63	–
			2	.75, 4	3.02	.54	–.69	1.33	–
Physical Health	PPH	1	1	1, 5	3.63	.88	–.14	–.34	–
			2	1, 5	3.61	.79	–.14	–.13	–

S Subsample, *Min.*, *Max.* Minimum and maximum observed scale scores

outcomes (i.e., social connectedness, life satisfaction, academic achievement, and physical health); and significant, small-to-moderate positive relations between emotional wellbeing variables and the quality-of-life outcomes. The only exceptions to this trend were the non-significant correlations between academic achievement–optimism and academic achievement–engagement (see Table 2). Table 3 presents the results of the bidimensional emotional-health-status groupings of participants in Subsample 1. Using the procedures described above, the majority of participants were categorized as having healthy emotionality, while far fewer participants were classified as having mixed, diminished, and unhealthy emotionality, respectively.

Continuous Approach Findings from the CFA conducted with Subsample 2 using the revised DASS–19, which regressed all items onto their respective latent, correlated factors (i.e., depression and anxiety), yielded an adequate data-model fit— $\chi^2 = 408.86$, $df = 149$, $p < .001$, Comparative Fit Index (CFI) = .938, Standardized Root Mean Square Residual (SRMR) = .047, Root Mean Square Error of Approximation (RMSEA) [95 % CI] = .060 [.053, .067]—with significant, positive standardized path coefficients (depression $\lambda = .52$ –.84, anxiety $\lambda = .34$ –.77) and a strong, positive interfactor correlation ($\phi = .77$). Moreover, findings from the CFA conducted with Subsample 2 using the revised GQ–5, the PANAS–P, and the LOT–R, which were all

Table 2 Bivariate correlations among primary study variables: Subsample 1

Construct	1.	2.	3.	4.	5.	6.	7.	8.	9.
1. Depression	1								
2. Anxiety	.63**	1							
3. Gratitude	–.42**	–.23**	1						
4. Optimism	–.50**	–.36**	.42**	1					
5. Engagement	–.52**	–.23**	.45**	.55**	1				
6. Social Connectedness	–.61**	–.40**	.45**	.43**	.51**	1			
7. Life Satisfaction	–.56**	–.35**	.42**	.50**	.54**	.61**	1		
8. Academic Achievement	–.15**	–.15**	.11*	.06	.06	.11*	.21**	1	
9. Physical Health	–.28**	–.23**	.18**	.30**	.33**	.22**	.27**	.04	1

** $p < .01$ level, * $p < .05$ level

Table 3 Bidimensional emotional health status groupings: Subsample 1

	Emotional Wellbeing	
	Languishing-to-Low	Moderate-to-Flourishing
Low-to-Moderate	Diminished Emotionality ($n = 43$, 9.3 %)	Healthy Emotionality ($n = 341$, 74 %)
At-Risk-to-Clinical	Unhealthy Emotionality ($n = 26$, 5.6 %)	Mixed Emotionality ($n = 51$, 11.1 %)

intercorrelated, also yielded an adequate data–model fit— $\chi^2 = 428.09$, $df = 183$, $p < .001$, CFI = .932, SRMR = .051, RMSEA [95 % CI] = .052 [.046, .059]—with significant, positive standardized path coefficients (gratitude $\lambda = .51$ –.69, engagement $\lambda = .51$ –.75, optimism $\lambda = .40$ –.76) and moderate, positive interfactor correlations ($\phi = .51$ –.55). Table 1 presents the descriptive statistics and reliabilities for all primary variables in the continuous analyses. Given the observed distributions and internal consistency of the variables of interest, all intended primary analyses were deemed appropriate.

Primary Analyses

Categorical Approach Table 4 presents findings from the series of ANOVA conducted with Subsample 1. Significant main effects for emotional distress and overall bidimensional emotional health were observed across all quality-of-life outcomes, while a significant main effect for emotional wellbeing was observed across most quality-of-life outcomes, excepting academic achievement. Both R^2 and Hedges' g statistics indicated small-to-moderate effect sizes for emotional distress and wellbeing on academic achievement and physical health, yet large effect sizes for both social connectedness and life satisfaction (see Table 4). Table 5 presents findings from the planned comparisons conducted between selected bidimensional emotional-health-status groups.

Although non-significant comparisons were observed between all groups for academic achievement, significant comparisons were observed between all groups across the physical health, social connectedness, and life satisfaction outcomes. Moreover, Hedge's g statistics indicated moderate effect sizes for the comparisons between the mixed emotionality–unhealthy emotionality groups as well as moderate-to-large effect sizes for the comparisons between the healthy emotionality–diminished emotionality and health emotionality–unhealthy emotionality groups (see Table 5).

Continuous Approach Figures 1, 2, and 3 represent the key findings from the series of LVPA conducted with Subsample 2. Findings from the first LVPA (Model 1) indicated that the emotional wellbeing latent construct had significant, positive standardized path coefficients extending to its indicator variables (i.e., gratitude, optimism, and engagement) as well as to all quality-of-life outcomes variables (see Fig. 1), and that the overall data–model fit was excellent (see Table 6). Findings from second LVPA (Model 2) indicated that the emotional distress latent variable had significant, positive standardized path coefficients extending to its indicator variables (i.e., depression and anxiety) as well as significant, negative coefficients extending to all quality-of-life outcomes (see Fig. 2), and that the overall data–model fit was adequate (see Table 6). Furthermore, findings from the third and final LVPA (Model 3), which combined and correlated the emotional distress and

Table 4 ANOVA results: Subsample 1

Independent Variable	Dependent Variable	F	p	R^2	g [95 % CI]
Emotional Distress	Academic Achievement	9.97	.002	.02	.39 [.34, .44]
	Physical Health	12.27	.001	.03	.44 [.36, .52]
	Social Connectedness	114.31	< .001	.20	1.33 [.42, 2.24]
	Life Satisfaction	66.72	< .001	.13	1.03 [.46, 1.59]
Emotional Wellbeing	Academic Achievement	2.56	.110	.01	.20 [.15, .25]
	Physical Health	29.17	< .001	.06	.70 [.62, .76]
	Social Connectedness	97.71	< .001	.18	1.29 [.36, 2.21]
	Life Satisfaction	93.47	< .001	.17	1.26 [.70, 1.81]
Bidimensional Emotional Health	Academic Achievement	4.20	.006	.03	–
	Physical Health	11.69	< .001	.07	–
	Social Connectedness	68.78	< .001	.31	–
	Life Satisfaction	51.21	< .001	.25	–

Table 5 Planned comparisons results for bidimensional emotional health groups: Subsample 1

Dependent Variable	Group		M Diff. (A–B)	t	p	g [95 % CI]
	(A)	(B)				
Academic Achievement	HE	UE	.17	1.59	.113	.32 [.27, .38]
	HE	DE	.13	1.49	.14	.27 [.21, .31]
	ME	UE	-.08	.62	.54	.12 [-.03, .27]
Physical Health	HE	UE	.83	4.77	< .001	.96 [.87, 1.05]
	HE	DE	.52	3.76	< .001	.60 [.52, .69]
	ME	UE	.59	2.86	.004	.73 [.55, .91]
Social Connectedness	HE	UE	18.80	9.96	< .001	2.13 [1.23, 3.03]
	HE	DE	12.23	8.15	< .001	1.37 [.48, 2.36]
	ME	UE	6.20	2.78	.006	.56 [-1.90, 3.02]
Life Satisfaction	HE	UE	9.51	8.08	< .001	1.66 [1.08, 2.25]
	HE	DE	7.83	8.37	< .001	1.38 [.81, 1.95]
	ME	UE	3.43	2.46	.03	.54 [-.88, 1.95]

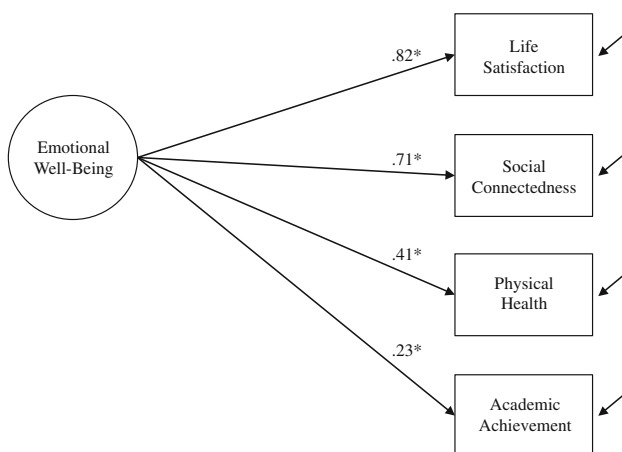
M Diff. Observed mean score difference, HE healthy emotionality (n = 341), UE unhealthy emotionality (n = 26), ME mixed emotionality (n = 51), DE diminished emotionality (n = 43)

emotional wellbeing latent variables from the previous two models, indicated significant, positive standardized path coefficients extending to both constructs’ indicator variables, as well as an excellent overall data–model fit (see Table 6). Additionally, the third LVPA (Model 3) also indicated that all standardized path coefficients extending from emotional distress to the quality-of-life outcomes were non-significant, while all coefficients extending from emotional wellbeing to the outcomes were significant and positive (see Fig. 3). Considered together, each LVPA demonstrated a similar trend in the amount of variance accounted for in the outcome variables by the predictor variables—yielding the highest squared multiple correlation values (R^2) for life satisfaction and social connectedness, and the lowest for academic achievement and physical health, respectively (see Table 7).

Discussion

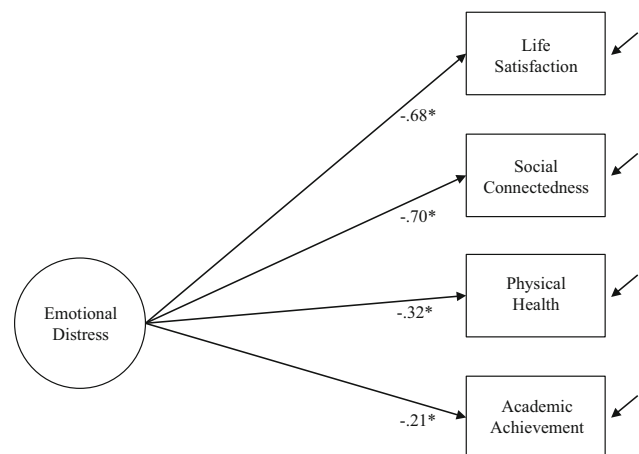
Interpretation of Results

Categorical Analytic Approach The primary purpose of the present study was to further investigate the bidimensional model of emotional health by exploring its concurrent validity via two analytic approaches: one employing categorical data and the other utilizing continuous data. Findings from the categorical analyses, conducted with Subsample 1, suggested that the bidimensional emotional health model—comprised of healthy, unhealthy, mixed, and diminished emotionality groups—had incremental classification validity in relation to both the unidimensional emotional wellbeing and distress models. Such incremental validity was demonstrated by larger



Note. * = Standardized path coefficient significant at the $p < .001$ level.

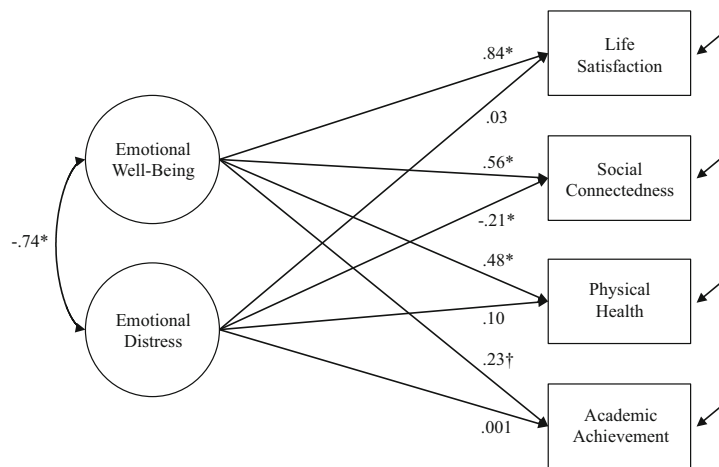
Fig. 1 Latent variable path analysis: emotional wellbeing model



Note. * = Standardized path coefficient significant at the $p < .001$ level.

Fig. 2 Latent variable path analysis: emotional distress model

Fig. 3 Latent variable path analysis: bidimensional emotional health model



Note. * = Standardized path coefficient significant at the $p < .001$ level, † = $p < .005$ level.

R^2 values for the bidimensional main effect, in comparison with the unidimensional distress and wellbeing main effects, across all quality-of-life outcomes (see Table 4). However, despite showing incremental validity, it is noteworthy that similar trends in outcome effect sizes were observed across both bidimensional and unidimensional effects, with social connectedness having the largest R^2 and Hedges’ g values, followed by life satisfaction, physical health, and academic achievement, respectively.

Further concurrent validity for the bidimensional model of emotional health was evidenced through effect size trends observed in the planned comparisons between the healthy–unhealthy, healthy–diminished, and mixed–unhealthy emotionality groups. Specifically, the largest Hedges’ g values were yielded for the outcomes in the healthy–unhealthy comparisons, while moderate to large Hedges’ g values were observed for the majority of outcomes in the healthy–diminished and mixed–unhealthy comparisons (see Table 5). Taken together, these findings suggest that the presence of wellbeing makes a substantive difference in light of both the presence and absence of distress symptoms, as better physical health, social connectedness, and life satisfaction outcomes were observed for the mixed and healthy emotionality groups in comparison to the diminished and unhealthy groups. Furthermore, such findings suggest that bidimensional emotional-health-

status had the strongest effect on participants’ social connectedness, which is a construct that has been shown to be highly predictive of student persistence and academic performance during college (Robbins et al. 2006). That said, although a bidimensional main effect was observed for academic achievement, it is noteworthy that the planned comparisons yielded non-significant differences for this outcome—suggesting that the significant differences were observed within one or more of the potential group comparisons that isolated the presence and absence of emotional distress symptoms (i.e., healthy—mixed and/or diminished—unhealthy) and, thus, that the presence of wellbeing did not have a substantive effect on academic achievement. Taken together, these findings generally concurred with those from previous research validating the bidimensional model of mental health among college students (Eklund et al. 2011; Renshaw & Cohen 2014).

Continuous Analytic Approach Interestingly, findings from the continuous analyses, conducted with Subsample 2, yielded different conclusions than did findings from the categorical analyses. Specifically, findings from the series of LVPA showed that Model 1, which investigated emotional wellbeing as a predictor of the quality-of-life outcomes, had both the best data–model fit statistics (see Table 5) and the strongest

Table 6 Data–model fit indices for structural equation models: Subsample 2

Model	χ^2	df	p	CFI	SRMR	RMSEA [90%CI]
CFA: EW–ED	10.5	4	.03	.992	.021	.058 [.015, .102]
LVPA 1: EW	26.9	14	.02	.985	.028	.043 [.017, .068]
LVPA 2: ED	92.2	9	< .001	.912	.055	.137 [.113, .164]
LVPA 3: BEH	47.5	22	< .001	.984	.028	.049 [.030, .068]

EW emotional wellbeing, ED emotional distress, BEH bidimensional emotional health

Table 7 Squared multiple correlations for LVPA models: Subsample 2

Dependent Variable	Model R^2 [95 % CI]		
	LVPA 1: EW	LVPA 2: ED	LVPA 3: BEH
Life Satisfaction	.68 [.63, .73]	.46 [.40, .52]	.67 [.62, .72]
Social Connectedness	.50 [.44, .56]	.48 [.42, .54]	.53 [.47, .59]
Academic Achievement	.17 [.11, .23]	.11 [.06, .16]	.17 [.11, .23]
Physical Health	.05 [.01, .09]	.04 [.01, .07]	.05 [.01, .09]

EW emotional wellbeing, ED emotional distress, BEH bidimensional emotional health

standardized path coefficients (see Fig. 1). Although Model 2, investigating emotional distress, was also characterized by strong standardized path coefficients (see Fig. 2), it had less-optimal data–model fit statistics (see Table 5) and accounted for far less of the variance in the life satisfaction and academic achievement outcomes (see Table 6). Moreover, although Model 3, which investigated bidimensional emotional health (i.e., correlated emotional wellbeing and distress variables), had excellent data–model fit statistics (see Table 5), it was characterized by several non-significant standardized path coefficients (see Fig. 3) and accounted for approximately the same amount of variance in the outcomes as Model 1. Thus, although the bidimensional emotional health model appeared viable statistically, the emotional wellbeing model was ultimately selected as the most conceptually parsimonious and robust predictive model overall.

Considering the LVPA findings more closely, it is noteworthy that Model 3 yielded a strong, negative correlation between the emotional wellbeing and distress variables (see Fig. 3), which suggests they shared approximately 55 % of their variance with each other. Given that Model 3 also demonstrated non-significant standardized path coefficients from emotional distress to the life satisfaction, physical health, and academic achievement outcomes, it appears that the strong path coefficients demonstrated in Model 2 were mostly attributable to the shared variance between the distress and wellbeing variables, and therefore are not uniquely attributable to emotional distress alone. This finding and its implications are reversed, however, for emotional wellbeing, as Model 1 demonstrated similar path coefficients to Model 3, suggesting that the strong path coefficients were largely attributable to the variance unique to wellbeing. Furthermore, it is noteworthy that extremely large effect sizes were observed for the life satisfaction and social connectedness variables, while moderate effects were observed for academic achievement and physical health (see Table 6). Taken together, such findings provide initial evidence in favor of emotional wellbeing—operationalized as a latent variable indicated by gratitude, engagement, and optimism—as a distinguishing predictor of college student outcomes.

Comparison of Analytic Approaches Given methodological differences, findings from the continuous and categorical analyses cannot be compared directly or internally; however, indirect or external comparisons are still useful for the purposes of exploring outcome trends and implications. At the basic level of comparative validity, then, there are a couple findings that warrant consideration. Foremost, results from the categorical analyses favored the bidimensional emotional health model over the unidimensional distress and wellbeing models, while findings from the continuous analyses favored the unidimensional emotional wellbeing model over the bidimensional and unidimensional distress models. Additionally, compared to the categorical

analyses, findings from the continuous analyses yielded substantially larger effect sizes in relation to the majority of outcomes, excepting physical health, which demonstrated similar effect sizes. These substantive differences suggest that, as operationalized in the present study, categorical and continuous approaches to investigating bidimensional mental health may yield incongruent findings that have differing theoretical and practical implications. Ultimately, the upshot of the observed differences in findings from the two analytic approaches leads us to reject our primary hypothesis—that both analytic approaches would support the bidimensional model of emotional health—and conclude that the bidimensional model was only supported via the categorical analytic approach.

Limitations and Future Research

Although the results of the present study provide beneficial data regarding the utility of categorical and continuous approaches for investigating bidimensional emotional health, such findings should be considered in light of a few methodological limitations. First, given that the present sample was comprised of a convenience sample of self-selected college students from a university in the southern region of the United States, the findings may not be generalizable to other college-student populations. Second, because all of the measures in the present study were self-reported, the data may be confounded by social-desirability effects (e.g., participants self-reporting higher GPAs than were actually obtained). And because the majority of measures were self-report rating scales, the data might be further biased by common-method variance (i.e., the variance attributable to the measurement method rather than to the constructs represented by the measures; Podsakoff et al. 2003). To account for these potential sources of error, we recommend that future research investigating bidimensional emotional health expand the repertoire of concurrent and predictive validity measures to include different types of self-report measures (e.g., frequency estimates of academic and coping behaviors) as well as more objective measures (e.g., university-reported GPA and attendance rates) and categorical outcomes (e.g., graduated vs. non-graduated). Next, it is noteworthy that the classification schema used to derive the categorical approach was based on a 1 *SD* cut-off score decision rule, which was the precedent in previous research (e.g., Renshaw and Cohen 2014), yet which is also somewhat arbitrary. Because it is possible that changing the cut-score criteria alone (e.g., 1.5 *SD* or 2 *SD*) could slightly or substantially modify the results obtained from this model, we suggest future research is warranted to explicitly investigate the issue of alternative cut-scores within the categorical approach.

Given the small group sizes of several of the bidimensional emotional health groups, the 95 % confidence intervals of the Hedges' *g* effect sizes for several of the outcomes are wide-

ranging and imprecise, limiting the generalizability of these findings. Thus, we suggest that replication studies with larger sample sizes are warranted to yield more precise confidence intervals that will enhance the generalizability of results. Furthermore, considering that the sample consisted of a cross-section of typical and mostly healthy college students, it is possible that the findings regarding comparative model validity are contextually bound to sample demographics relative to baseline mental health rates. Specifically, it seems plausible that comparative model validity might differ as a function of the general prevalence of psychopathology and wellbeing within a given sample. Future research is therefore warranted to investigate the generalizability of the results observed herein with clinical-only and at-risk-only samples. Finally, as with all cross-sectional and correlational research designs, it is important to remember that the data do not suggest causal relationships, as it may be the case that the associations between outcome and predictor variables are actually reciprocal (e.g., life satisfaction may also be a predictor of emotional wellbeing, not solely its outcome). Although such complex and dynamic relationships between bidimensional mental health models and valued outcomes have yet to be investigated, it appears feasible that experimental intervention research could be conducted to manipulate levels of the emotional wellbeing and distress variables investigated in the present study to observe the influence of their alteration on the supposed outcomes of interest. However, there seems to be much more basic measurement and modeling work to do prior to extending this approach to treatment research.

Implications for Theory and Practice

Despite the limitations noted above, findings from the present study may have a few noteworthy implications for the theory and practice of mental health work at the college level. Regarding theory, this study was the first that we know of to investigate and compare the concurrent validity of both categorical and continuous approaches to operationalizing college students' bidimensional emotional health. To this end, findings from the present study provide further validation of the categorical approach to investigating the bidimensional model of mental health among college students (see Eklund et al. 2011; Renshaw and Cohen 2014) and, moreover, suggest that bidimensional emotional health, which is a sub-phenomenon of this larger model, is a legitimate and viable construct for future categorical research. That said, given that findings from the continuous analyses showed that the emotional wellbeing model was a more parsimonious and robust predictor of the quality-of-life outcomes than was the bidimensional model, it is possible that utility of the bidimensional model is only manifest via categorical analyses, which, to date, have been the predominant approach to investigating this phenomena (e.g., Antaramian et al. 2010; Suldo et al. 2011). Thus, we recommend

that future studies of college student mental health use similar methods—comparing categorical and continuous analytic approaches—to test the comparative validity of different approaches to modeling bidimensional mental health and its relation to valued life outcomes.

Findings from the continuous analyses also contribute to theory by further validating the importance of subjective wellbeing indicators in relation to college student outcomes. Previous research has demonstrated that resilience, positive mental health, and character strengths are associated with greater academic success and college completion (Hartley 2011; Lounsbury et al. 2009), and results from this study further this line of inquiry by suggesting that temporal emotional wellbeing or positive affectivity—conceptualized as a latent construct indicated by gratitude, engagement, and optimism—is also strongly associated with student outcomes. To further investigate the utility of this temporal conception of emotional wellbeing, we recommend that future research test its concurrent and predictive validity in comparison with other isolated conceptualizations of subjective wellbeing (e.g., life satisfaction paired with recent affective experience; Long et al. 2012) and cumulative conceptualizations of wellbeing (e.g., covitality; Furlong et al. 2014; Furlong et al. 2013; Renshaw and Bolognino 2016; Renshaw 2015, 2016; Renshaw et al. 2015; You et al. 2014), as well as in relation to a variety of other student outcomes (e.g., academic behaviors and attendance rates).

Although the findings from the different analytic approaches appear to have conflicting implications, we suggest that they share an underlying implication for practice of mental health work at the college level: emphasizing the importance of considering college students' emotional wellbeing within the realm of mental health assessment and intervention. Given that mental health practice has been historically concerned with assessing and remediating symptoms of psychopathology (Keyes 2005, 2007), the majority of mental health practitioners currently working with college students are unlikely to consider subjective wellbeing as a domain of functioning that warrants assessment and, potentially, intervention. However, results from this study suggest that emotional wellbeing is just as important as—and perhaps even more important than—emotional distress, at least in relation to predicting college students' academic achievement, social connectedness, and life satisfaction outcomes. Thus, to better serve college students, mental health service providers might consider integrating wellbeing assessments and interventions with traditional symptoms-based practices. Moreover, given that some studies have indicated up to 50 % of college students self-reporting mental health problems (e.g., Blanco et al. 2008) and that emotional health substantially influences retention rates (e.g., Pritchard and Wilson 2003), we further suggest that practitioners consider using emotional wellbeing measures within population-based mental health screening and prevention programs on college campuses.

Finally, in closing, we consider the conflicting practical implications of this study: namely, that findings from the categorical analyses favor a bidimensional model of emotional health, while results from the continuous analyses favor a unidimensional model of emotional wellbeing. Ultimately, to reconcile these results, we suggest that the findings that are most generalizable to applied mental health work should be given preference in practice. More specifically, given that mental health practice typically relies on categorical assessments (for both individualized evaluations and population-based screenings) to inform intervention planning, and considering that findings from continuous data analyses do not translate clearly into intervention recommendations, we suggest that the findings from the categorical analyses favoring the bidimensional emotional health model (in the present study) and bidimensional mental health model (in other studies) currently have the closest relation to actual mental health work and, as a result, should be given preference in practice. However, we would like to conclude by again drawing attention to the substantive findings yielded by the continuous analytic approach—suggesting the superiority of the emotional wellbeing model—and express our hope that future efforts will bridge the research–practice gap that currently hinders the ground-level applicability of these findings. Because the ultimate utility of work such as this hinges not only on how statistically robust the findings are, but also on how relevant such findings are for informing mental health practice in real-world settings.

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Compliance with Ethical Standards

Conflict of Interest Tyler L. Renshaw, Katie R. Eklund, Sarah J. Bolognino and Isoken Adodo declare that they have no conflict of interest.

Experiment Participants The experimental protocol was approved by the first author's institutional review board and meet all guidelines laid out by governing agencies for ethical research.

Funding No funding was received to support the present research.

Ethical Approval All procedures involving human participants in this study were conducted in accordance with the ethical standards of the authors' institutional research committees and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent Informed consent was obtained from all individual participants included in the study.

References

- Andersson, G. (1996). The benefits of optimism: a meta-analytic review of the life orientation test. *Personality and Individual Differences, 21*, 719–725. doi:10.1016/0191-8869(96)00118-3.
- Andrews, B., & Wilding, J. M. (2004). The relation of depression and anxiety to life-stress and achievement in students. *British Journal of Psychology, 95*, 509–521. doi:10.1348/0007126042369802.
- Antaramian, S. P., Huebner, E. S., Hills, K. J., & Valois, R. F. (2010). A dual-factor model of mental health: toward a more comprehensive understanding of youth functioning. *American Journal of Orthopsychiatry, 80*, 462–472. doi:10.1111/j.1939-0025.2010.01049.x.
- Antony, M. M., Bieling, P. J., Cox, B. J., Enns, M. W., & Swinson, R. P. (1998). Psychometric properties of the 42-item and 21-item versions of the Depression Anxiety Stress Scales (DASS) in clinical groups and a community sample. *Psychological Assessment, 10*, 176–181. doi:10.1037/1040-3590.10.2.176.
- Blanco, C., Okuda, M., Wright, C., Hasin, D. S., Grant, B. F., Shang-Min, L., & Olfson, M. (2008). Mental health of college students and their non-college attending peers. *Archives of General Psychiatry, 65*, 1429–1437. doi:10.1001/archpsyc.65.12.1429.
- Crawford, J. R., & Henry, J. D. (2004). The Positive and Negative Affect Schedule (PANAS): construct validity, measurement properties and normative data in a large non-clinical sample. *British Journal of Clinical Psychology, 43*, 245–265. doi:10.1348/0144665031752934.
- Davidson, L., Drake, R., Schmutte, T., Dinzeo, T., & Andres-Hyman, R. (2009). Oil and water or oil and vinegar? Evidence-based medicine meets recovery. *Community Mental Health Journal, 45*, 323–332. doi:10.1007/s10597-009-9228-1.
- Diener, E., Emmons, R. A., Larsen, R. J., & Griffin, S. (1985). The satisfaction with life scale. *Journal of Personality Assessment, 49*, 71–75. doi:10.1207/s15327752jpa4901_13.
- Doll, B. (2008). The dual-factor model of mental health in youth. *School Psychology Review, 37*, 69–73.
- Eklund, K., Dowdy, E., Jones, C., & Furlong, M. J. (2011). Applicability of the dual-factor model of mental health for college students. *Journal of College Student Psychotherapy, 25*, 79–92. doi:10.1080/87568225.2011.532677.
- Furlong, M. J., You, S., Renshaw, T. L., O'Malley, M. D., & Rebelez, J. (2013). Preliminary development of the positive experiences at school scale for elementary school children. *Child Indicators Research, 6*, 753–775. doi:10.1007/s12187-013-9193-7.
- Furlong, M. J., You, S., Renshaw, T. L., Smith, D. C., & O'Malley, M. D. (2014). Preliminary development and validation of the social and emotional health survey for secondary students. *Social Indicators Research, 117*, 1011–1032. doi:10.1007/s11205-013-0373-0.
- Gallagher, R. (2007). *National survey of counseling center directors. monograph series No. 8P*. Alexandria: International Association of Counseling Services, Inc..
- Hartley, M. T. (2011). Examining the relationships between resilience, mental health, and academic persistence in undergraduate college students. *Journal of American College Health, 59*, 596–604. doi:10.1080/07448481.2010.515632.
- Kessler, R. C., Berglund, P., Demler, O., Jin, R., Merikangas, K. R., & Walters, E. E. (2005). Lifetime prevalence and age-of-onset distributions of DSM-IV disorders in the national comorbidity survey replication. *Archives of General Psychiatry, 62*, 593–602. doi:10.1001/archpsyc.62.6.593.
- Keyes, C. L. M. (2005). Mental illness and/or mental health? Investigating axioms of the complete state model of health. *Journal of Consulting and Clinical Psychology, 73*, 539–548. doi:10.1037/0022-006X.73.3.539.
- Keyes, C. L. M. (2007). Promoting and protecting mental health as flourishing: a complimentary strategy for improving national mental

- health. *American Psychologist*, 62, 95–108. doi:10.1037/0003-066X.62.2.95.
- Keyes, C. L. M., Dhingra, S. S., & Simones, E. J. (2010). Change in level of positive mental health as a predictor of future risk of mental illness. *Journal of Public Health*, 100, 2366–2371. doi:10.2105/AJPH.2010.192245.
- Kitzrow, M. A. (2003). The mental health needs of today's college students: challenges and recommendations. *NASPA Journal*, 41(1), 167–181.
- Long, R. F., Huebner, E. S., Wedell, D. H., & Hills, K. J. (2012). Measuring school-related subjective well-being in adolescents. *American Journal of Orthopsychiatry*, 82, 50–60. doi:10.1111/j.1939-0025.2011.01130.x.
- Lounsbury, J. W., Fisher, L. A., Levy, J. J., & Welsh, D. P. (2009). An investigation of character strengths in relation to the academic success of college students. *Individual Differences Research*, 7, 52–69.
- McCullough, M. E., Emmons, R. A., & Tsang, J. (2002). The grateful disposition: a conceptual and empirical topography. *Journal of Personality and Social Psychology*, 82, 112–127. doi:10.1037/0022-3514.82.1.112.
- McCullough, M. E., Tsang, J., & Emmons, R. A. (2004). Gratitude in intermediate affective terrain: links of grateful moods to individual differences and daily emotional experiences. *Journal of Personality and Social Psychology*, 86, 295–309. doi:10.1037/0022-3514.86.2.295.
- Mowbray, C. T., Megivern, D., Mandiberg, J. M., Strauss, S., Stein, C. H., Collins, K., et al. (2006). Campus mental health services: recommendations for change. *American Journal of Orthopsychiatry*, 76, 226–237. doi:10.1037/0002-9432.76.2.226.
- Oishi, S., Diener, E. F., Lucas, R. E., & Suh, E. M. (1999). Cross-cultural variations in predictors of life satisfaction: perspectives from needs and values. *Personality and Social Psychology Bulletin*, 25, 980–990. doi:10.1177/01461672992511006.
- Page, A. C., Hooke, G. R., & Morrison, D. L. (2007). Psychometric properties of the Depression Anxiety Stress Scales (DASS) in depressed clinical samples. *British Journal of Clinical Psychology*, 46, 283–297. doi:10.1348/014466506X158996.
- Pavot, W., & Diener, E. (1993). Review of the satisfaction with life scale. *Psychological Assessment*, 5, 164–172. doi:10.1037/1040-3590.5.2.164.
- Plicher, J. J. (1998). Affective and daily event predictors of life satisfaction in college students. *Social Indicators Research*, 43, 291–306. doi:10.1023/A:1006883231707.
- Podsakoff, P. M., MacKenzie, S. B., Lee, J.-Y., & Podsakoff, N. P. (2003). Common method biases in behavioral research: a critical review of the literature and recommended remedies. *Journal of Applied Psychology*, 88, 879–903. doi:10.1037/0021-9010.88.5.879.
- Pritchard, M. E., & Wilson, G. S. (2003). Using social and emotional factors to predict student success. *Journal of College Student Development*, 44, 18–28.
- Renshaw, T. L. (2015). Psychometric properties of the Social and Emotional Health Survey with a small sample of academically at-risk adolescents. *Journal of Psychoeducational Assessment*. Advance online publication. doi:10.1177/0734282915614495.
- Renshaw, T. L. (2016). Technical adequacy of the Positive Experiences at School Scale with adolescents. *Journal of Psychoeducational Assessment*. Advance online publication. doi:10.1177/0734282915627920.
- Renshaw, T. L., & Bolognino, S. J. (2016). The College Student Subjective Wellbeing Questionnaire: A brief, multidimensional, domain-specific measure of undergraduates' covitality. *Journal of Happiness Studies*, 17, 463–484. doi:10.1007/s10902-014-9606-4.
- Renshaw, T. L., & Cohen, A. S. (2014). Life satisfaction as a distinguishing indicator of college student functioning: further validation of the two-continua model of mental health. *Social Indicators Research*, 117, 319–334. doi:10.1007/s11205-013-0342-7.
- Renshaw, T. L., Long, A. C. J., & Cook, C. R. (2015). Assessing adolescents' positive psychological functioning at school: Development and validation of the Student Subjective Wellbeing Questionnaire. *School Psychology Quarterly*, 30, 534–552. doi:10.1037/spq0000088.
- Richardson, M., Abraham, C., & Bond, R. (2012). Psychological correlates of university students' academic performance: a systematic review and meta-analysis. *Psychological Bulletin*, 138, 353–387. doi:10.1037/a0026838.
- Robbins, S., Allen, J., Casillas, A., Peterson, C., & Le, H. (2006). Unraveling the differential effects of motivational and skills, social, and self-management measures from traditional predictors of college outcomes. *Journal of Educational Psychology*, 98, 598–616. doi:10.1037/0022-0663.98.3.598.
- Russell, D. W. (1996). UCLA loneliness scale (version 3): reliability, validity, and factor structure. *Journal of Personality Assessment*, 66, 20–40. doi:10.1207/s15327752jpa6601_2.
- Russell, D., Peplau, L. A., & Cutrona, C. E. (1980). The revised UCLA loneliness scale: concurrent and discriminant validity evidence. *Journal of Personality and Social Psychology*, 39, 472–480. doi:10.1037/0022-3514.39.3.472.
- Salovey, P., Rothman, A. J., Detweiler, J. B., & Steward, W. T. (2000). Emotional states and physical health. *American Psychologist*, 55, 110–121. doi:10.1037/0003-066X.55.1.110.
- Scheier, M. F., Carver, C. S., & Bridges, M. W. (1994). Distinguishing optimism from neuroticism (and trait anxiety, self-mastery, and self-esteem): a reevaluation of the life orientation test. *Journal of Personality and Social Psychology*, 67, 1063–1078. doi:10.1037/0022-3514.67.6.1063.
- Seligman, M. E. P., & Csikszentmihalyi, M. (2000). Positive psychology: an introduction. *American Psychologist*, 55, 5–14. doi:10.1037/0003-066X.55.1.5.
- Suldo, S. M., & Shaffer, E. J. (2008). Looking beyond psychopathology: the dual-factor model of mental health in youth. *School Psychology Review*, 37, 52–68.
- Suldo, S. M., Thalji, A., & Ferron, J. (2011). Longitudinal academic outcomes predicted by early adolescents' subjective wellbeing, psychopathology, and mental health status yielded from a dual-factor model. *The Journal of Positive Psychology*, 6, 17–30. doi:10.1080/17439760.2010.536774.
- Watson, D., & Naragon, K. (2009). Positive affectivity: The disposition to experience positive emotional states. In S. J. Lopez & C. R. Synder (Eds.), *Oxford handbook of positive psychology* (pp. 207–215). New York: Oxford University Press.
- Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: the PANAS scales. *Journal of Personality and Social Psychology*, 54, 1063–1070. doi:10.1037/0022-3514.54.6.1063.
- Westerhoff, G. J., & Keyes, C. L. M. (2010). Mental illness and mental health: the two continua model across the lifespan. *Journal of Adult Development*, 17, 110–119. doi:10.1007/s10804-009-9082-y.
- You, S., Furlong, M. J., Dowdy, E., Renshaw, T. L., Smith, D. C., & O'Malley, M. D. (2014). Further validation of the social and emotional health survey for high school students. *Applied Research in Quality of Life*, 9, 997–1015. doi:10.1007/s11482-013-9282-2.