EMPIRICAL RESEARCH

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Factor Structure and Criterion Validity of the Five Cs Model of Positive Youth Development in a Multi-University Sample of College Students

Melissa R. Dvorsky[1,2] · Michael J. Kofler[3] · G. Leonard Burns[4] · Aaron M. Luebbe[5] · Annie A. Garner[6] ·
Matthew A. Jarrett[7] · Elia F. Soto[3] · Stephen P. Becker[1,8]

Abstract

There is growing recognition that clinical and developmental outcomes will be optimized by interventions that harness strengths in addition to ameliorating deficits. Although empirically-supported methods for identifying strengths are available for children and adolescents, this framework has yet to be applied to emerging adulthood. This study evaluates the nature of the Five Cs model of Positive Youth Development (PYD) – character, confidence, competence, connection, and caring – in a sample of emerging adults from six universities ($N = 4654$; 70% female; 81% White). Historically, PYD has been modeled as either separate correlated factors or a second-order factor structure. More recently, the bifactor model has been recommended to determine the degree to which PYD is unidimensional versus multidimensional. The present study examined the multidimensionality of PYD by comparing the model fit of a one-factor, five-correlated factor model, and second-order factor structure with a bifactor model and found support for the bifactor model with evidence of invariance across sex. Criterion validity was also assessed using three criterion measures particularly relevant for adjustment during emerging adulthood: anxiety, depressive symptoms, and emotion regulation difficulties. PYD and the residual Cs tended to correlate negatively with indicators of maladaptive development. Future directions including applications of the PYD framework as a measure of thriving across emerging adulthood are discussed.

Keywords Factor structure · Five Cs · Internalizing · Positive youth development · Resilience · Psychometrics

✉ Melissa R. Dvorsky
Melissa.Dvorsky@ucsf.edu

1   Division of Behavioral Medicine and Clinical Psychology, Cincinnati Children's Hospital Medical Center, 3333 Burnet Avenue, MLC 10006, Cincinnati, OH 45229, USA

2   Department of Psychiatry, University of California, San Francisco, 401 Parnassus Avenue, San Francisco, CA 94143-0984, USA

3   Department of Psychology, Florida State University, 1107W. Call St., Tallahassee, FL 32306, USA

4   Department of Psychology, Washington State University, Johnson Tower 212, Pullman, WA 99164, USA

5   Department of Psychology, Miami University, 218 Psychology Building, Oxford, OH 45056, USA

6   Department of Psychology, Saint Louis University, 3700 Lindell Boulevard, Room 2323, St. Louis, MO 63108, USA

7   Department of Psychology, University of Alabama, Box 870348, Tuscaloosa, AL 35487, USA

8   Department of Pediatrics, University of Cincinnati College of Medicine, 3230 Eden Avenue, Cincinnati, OH 45267, USA

Introduction

Historically, research on adolescence and emerging adulthood has been framed by a "deficit perspective" that emphasizes risks and problem behaviors (e.g., Bowers et al. 2010; Roth and Brooks-Gunn 2003). This deficit perspective is reflected in the prevalence of risk and problematic behavior measures, with positive development often reflecting the absence of, or decreases in, problem behaviors. A more recent approach to adolescent development—the positive youth development (PYD) perspective (Lerner et al. 2009a, 2009b; Lerner et al. 2011)—has emerged over the past two decades and advocates for identifying the strengths of young people that serve as indicators of thriving, well-being, and positive development. The PYD perspective emphasizes identifying and bolstering positive functioning rather than simply preventing or reducing negative developmental outcomes (Masten 2014). Several theoretical frameworks of PYD have been conceived in

response to the need for strength-based measures to assess the functioning of young people (see Lerner et al. 2013 for a review). The Five Cs Model of PYD is the most empirically-supported and widely-used framework in both research and youth programs (Eccles and Gootman 2002; Heck and Subramaniam 2009). However, further investigation of this model is needed to support its empirical validity in emerging adulthood, examine the manifestation of PYD across sex, and determine its association with functional outcomes.

The Five Cs Model of Positive Youth Development (PYD) and Prior Measurement

Early research on positive development was often described in a unidimensional manner as broadly the presence of adaptation or resilience (Masten 2014) that could be measured by a global factor (e.g., one-factor model). Over the decades, perspectives on developmental resilience and PYD became increasingly dynamic and grounded in developmental systems theory, emphasizing multi-faceted indicators of positive development (Masten 2011). The Five Cs Model of PYD operationalizes the multidimensional nature positive development through the assessment of five "Cs": Competence, Confidence, Character, Connection, and Caring (see Table 1 for a description). These five Cs are based on reviews of the adolescent development literature (Eccles and Gootman 2002; Lerner 2004) and have been linked to positive outcomes of youth programs (Roth and Brooks-Gunn 2003). Further, these five Cs represent prominently used terms by parents, clinicians, and researchers for describing characteristics of "thriving" (King et al. 2005). The 4-H Study of PYD (e.g., Lerner et al. 2005, 2011) is a longitudinal study spanning from Grade 5 to 12, providing support for the Five Cs Model from middle childhood to late adolescence. Lerner et al. (2005) proposed a higher-order, multi-dimensional measure of PYD that consisted of five first-order latent factors (i.e., five Cs) and several subsequent studies examined the validity of this model (e.g., Bowers et al. 2010; Jelicic et al. 2007; Phelps et al. 2009). The applicability of the Five Cs Model of PYD for adolescence has been demonstrated in the United States (e.g., Bowers et al. 2010) and internationally (e.g., Conway et al. 2015; Holsen et al. 2017). Although the fitted models required estimating numerous residual covariances among indicators, the results from these studies suggested that the Five Cs could be cast in terms of specific factors, which in turn load on a high-order, overarching PYD factor. In adolescence, this global PYD construct has been positively associated with indicators of adjustment including school engagement, successful self-regulation, community involvement, and hope (Lerner et al. 2013; Mueller et al. 2011; Phelps et al. 2009), as well as negatively associated with

risk and problem behaviors such as depressive symptoms, anxiety, and delinquency (Bowers et al. 2010; Phelps et al. 2009). In addition to global PYD, the specific 5C factors have been associated with key developmental outcomes in adolescence. For instance, Five C factors representing efficacious development (i.e., Confidence and Competence) have been associated with lower depressive symptoms and anxiety (Conway et al. 2015; Geldhof et al. 2014), while Connection has been positively associated with life satisfaction (Holsen et al. 2017) and negatively associated with depressive symptoms in late adolescence (Conway et al. 2015).

Bifactor Model of the Five Cs of PYD

Previous research has assumed that acceptable model fit for a higher-order confirmatory factor analysis (CFA) implies that this structure is appropriate; however, more recently, studies using bifactor models (Holsen et al. 2017; Geldhof et al. 2013, 2014) have shed new light on the structure of multifaceted constructs of the Five Cs to provide a more nuanced understanding of PYD. Specifically, in the bifactor model of PYD, each indicator loads onto two constructs: a global measure of PYD and one of five specific constructs which represent the variance in each C after controlling for global PYD. These studies have generated consistent support for the advantage of the bifactor model over models with hierarchal or second-order, correlated five-factors, or unidimensional models (Holsen et al. 2017; Geldhof et al. 2013, 2014). Further, researchers have found that the global PYD factor and the specific factors explain unique variances in adjustment above either separately (e.g., Holsen et al. 2017; Geldhof et al. 2014), which further demonstrates the importance of the bifactor model of PYD.

The bifactor model of PYD has both empirical, conceptual, and theoretical advantages over the previously examined higher-order model. Not only does the bifactor model provide statistically better fit in the 4-H data (see Geldhof et al. 2013, 2014) than the higher-order model or a five-correlated factor model (i.e., with no higher-order structure or global PYD factor), the bifactor model also maps more directly onto the original theoretical model of the Five Cs of PYD developed by Lerner and colleagues (e.g., Lerner et al. 2005). Whereas the higher-order models of PYD assume that each participant has a certain level of PYD, and that this overarching level of PYD causes their level of each specific C, and their latent C scores then causes their level on each indicator in the model; in a bifactor model the specific latent factors (i.e., Five Cs) represent systematic item variance not directly related to the overarching global dimension (i.e., PYD).

Although the original PYD framework (Lerner et al. 2005) speculates that the Five Cs are interrelated, it is not believed that these correlations exist only because of an

Table 1 Defining and measuring the five Cs of positive youth development

C	Definition	Indicators	Likert Rating	Item Count	Example Item
Competence	Positive view of one's actions in domain specific areas including social, academic, cognitive, and vocational. Social competence pertains to interpersonal skills (e.g., conflict resolution). School grades and self-ratings of academic competence make up academic competence.	Grades	1–4	1	NA
		Social competence	1–4	6	"Some people find it hard to make friends BUT For other people it's pretty easy"
		Academic competence	1–4	6	"Some people don't do very well with their school work BUT Other people do very well with their school work"
Confidence	An internal sense of overall positive self-worth and self-efficacy; one's global self-regard, as opposed to domain specific beliefs.	Positive identify	1–5	6	"On the whole I like myself"
		Self-worth	1–4	6	"Some people don't like the way they are leading their lives BUT Other people do like the way they are leading their lives"
Connection	Positive bonds with people and institutions that are reflected in bidirectional exchanges between the individual and peers, family, school, and community in which both parties contribute to the relationship.	Family	1–4	6	"I get along with my parents"
		School	1–4	7	"My teachers really care about me"
		Community	1–4	5	"In my town or city, I feel like I matter to people")
		Peers	1–5	4	"My friends are there when I need them"
Character	Respect for societal and cultural rules, possession of standards for correct behaviors, a sense of right and wrong (morality), and integrity	Behavioral conduct	1–4	6	"Some people usually do the right thing BUT Other people often don't do the right thing"),
		Valuing of diversity	1–5	4	"Enjoying being with people who are of a different race than I am"
		Personal values	1–5	5	"Doing what I believe is right even if my friends make fun of me"
		Social conscience	1–5	6	"Helping to make the world a better place to live in"
Caring	A sense of sympathy and empathy for others.	Caring	1–4	9	"It makes me sad to see a person who doesn't have friends"

The PYD-5C was developed in part by collating items from four previously established measures: the Profiles of Study Life-Attitudes and Behaviors Survey (PSL-AB; Benson et al. 1998), the Self-Perception Profile for Adolescents (SPPA; Harter 1983, 2012), the Peer Support Scale (Armsden and Greenberg 1987) from the Teen Assessment Project Survey Question Bank (Small and Rodgers 1995), and the Eisenberg Sympathy Scale (Eisenberg et al. 1996). Harter (2012) items (Social Competence, Academic Competence, Self-Worth, Behavioral Conduct) use a structured alternative response format. Participants are asked to choose between two types of people. Once they have selected which person they are most like, they are asked to decide if the exemplar is "really true for me" or "sort of true for me." The items are counterbalanced so that half begin with a positive sentence reflecting high competence or self-worth and half begin with a negative sentence reflecting low competence or self-worth. Each item is scored from 1 to 4; higher scores reflect higher perceived competence or self-worth. In the present study, all subscale item responses were rescaled to a 0–12 point scale according to the PYD scoring protocol (Lerner et al. 2010)

individual's global level of PYD. Indeed, breaking away from the higher-order structure, later examinations of the PYD framework added additional covariance paths between the Five Cs and between residuals of the specific indicators (Bowers et al. 2010; Jelicic et al. 2007; Phelps et al. 2009) to estimate these interrelations not captured by global PYD. However, this approach violates the assumptions of a higher-order model and results in an over-fitted model structure (MacCallum et al. 1992). Alternatively, the bifactor model does not require this obscure assumption and instead the global PYD reflects what is common among the items (i.e., Five Cs) and represents individual differences in PYD. As such, a bifactor model allows for both the global PYD scale and the residual Five C factors to covary independently with importance criterion measures (e.g., mood, self-regulation). Accordingly, it is hypothesized that the bifactor model will be the best-fitting model for the Five Cs of PYD in the present study. Since this framework has yet to be applied to the context of college or emerging adults, the bifactor model will be compared with other model structures including a one-factor model (i.e., single aggregate construct, global PYD), five correlated-factors model (i.e., no higher-order structure), and higher-order models that have been historically used to represent the Five Cs of PYD.

Positive Youth Development and Strength-based Approaches in College

Emerging adulthood is an important phase in the transition to adulthood spanning the ages of 18–25 years (Arnett 2000) and like all developmental transitions, this one represents a period of concentrated change in individuals, their contexts, and their relationships. Specifically, emerging adulthood is a prolonged period of exploration and change, characterized by new challenges as well as new opportunities for young people. Emerging adulthood has been described as a window of opportunity for young people to make positive changes and growth that enhances the course of their lives (Masten et al. 2006). However, it is also characterized by rapid changes that can lead to increased mental health concerns and risk behavior, particularly in the college context (Bruffaerts et al. 2018). College students often move away from home for the first time, form new social groups, and navigate new sets of demands to independently manage their lives in college (Arnett 2016). Some emerging adults thrive in this college environment of increased independence, whereas others struggle without the support of parents and teachers to monitor their progress and help them make decisions (Eccles 2004). To increase the likelihood of young people succeeding in emerging adulthood and during the transition to college, it is important to understand how successful or positive

development occurs in this context. As such, it is particularly important to examine predictors of successful adaptation and positive development as well to operationally define adapting well or positive development for this context.

The PYD perspective provides a framework for addressing the need for strength-based measures to assess the functioning of college students. Developmental theorists (Arnett 2000, 2016; Masten et al. 2006) have hypothesized that indicators of positive development during emerging adulthood include those still salient from the previous developmental period (i.e., adolescence) along with newly emerging domains that become important for the future (Masten et al. 2006). For instance, the developmental tasks of academic achievement, peer relationships, and rule-governed conduct (i.e., tasks salient during adolescence) remain important during emerging adulthood, while work and romantic relationships (i.e., key developmental tasks of adulthood) are emerging. Exploration of PYD in emerging adulthood and the college context provides preliminary empirical support for these similarities and differences in indicators of positive development during this period. For example, there is increasing evidence that connections to peers, professors, and the university are critical for promoting adjustment in order to cope with stressors in the transition to college (Gray et al. 2013). Brewer and colleagues (2018) demonstrated that engaged learning predicted positive development (defined as moral development, civic engagement, and the absence of alcohol problems) for first-year college students. Other indicators of PYD including academic competence, social connections, and self-concept have also demonstrated promotive effects against the development of mental health concerns, academic problems, and substance use for emerging adulthood and college students (Albert and Dahling 2016; Ben-Naim et al. 2017; Stone et al. 2012).

Although prior studies examining the Five Cs of PYD have demonstrated validity of this measure across middle childhood to late adolescence (Bowers et al. 2010; Conway et al. 2015; Phelps et al. 2009), and recent international studies have examined the Five Cs model of PYD in groups of late adolescents (Conway et al. 2015) and upper secondary school students (up to age 19; Holsen et al. 2017), no study to date has captured the multifaceted nature of positive development by using a multidimensional measure of positive development in emerging adulthood or college. It is possible that the original measurement structure of the Five Cs model of PYD is unique for college students because the developmental context of both emerging adulthood and the college setting is characterized by rapid changes in social context (Arnett 2016). It is important for research to extend findings for the PYD Five Cs Model from late adolescence into emerging adulthood and examine

the factor structures and criterion validity to determine whether this is a useful tool in the college setting.

Measurement Invariance for Males and Females

Previous PYD research has examined global PYD comparisons between males and females, with higher PYD observed in adolescent females (Lerner et al. 2005; Phelps et al. 2009). Differences across sex have also been found in predictors of college students' adjustment (e.g., Leong et al. 1997); although the exact nature of these specific effects is not always clear as findings are mixed depending upon the outcomes examined (Enochs and Roland 2006). Importantly, only one study to date has examined whether the underlying factors in the PYD framework perform the same across sex (i.e., is the measurement model invariant between males and females). In a sample of Irish adolescents (ages 11–19 years), Conway and colleagues (2015) found PYD subscale indicators to function similarly for both males and females. It is important to determine if individual factor scales are functioning similarly across both male and female emerging adults by assessing measurement invariance.

Current Study

The present study extends previous research by examining the factor structure of PYD as indexed by the Five Cs of PYD measured in a large sample of college students. Following recommendations from recent research with the 4-H Study (e.g., Geldhof et al. 2013), the PYD framework was modeled using a bifactor CFA and compared this model to that of the higher-order model, correlated five factors model, and a unidimensional model. Similar to Holsen et al. (2017) and following recommendations for bifactor models by Eid et al. (2017) that deviate from the traditional bifactor model, the present study used a bifactor (S·1-1) structure that allowed the residual factors to correlate by using a reference indicator for PYD (described below). That is, similar to recent bifactor models of PYD, these correlations were allowed given the interpretation that the residual C factors represent meaningful sources of true score variance rather than assuming they simply represent a complex error structure. Accordingly, the measure's structure and factorial invariance across sex was tested, while also presenting findings on the criterion validity of the overarching measure of PYD as well as for the residual C constructs that represent systematic item variance not directly related to the overall PYD construct. Specifically, correlations between all PYD constructs and the criterion variables of depressive symptoms, anxiety symptoms, and emotion dysregulation,

controlling for key demographic covariates (i.e., sex, age, race, and university) were examined. Importantly, internalizing problems are among the most common mental health problems experienced by college students (Eisenberg et al. 1996) and represent critical indicators of adjustment in emerging adulthood (Bruffaerts et al. 2018). The prevalence and impairment of anxiety and depression, among college students is current a national crisis that is taxing the resources of college counseling centers (Hunt and Eisenberg 2010; Xiao et al. 2017). The successful adaptation in the face of these challenges is what operationalizes resilience (Lerner et al. 2013) and is critical to enhancing positive development (Lerner et al. 2009a, 2009b). The PYD perspective provides a framework for colleges in addressing the need for strength-based measures to assess the functioning of young people. If the PYD perspective is leveraged, colleges may be to prevent or treat these symptoms from a strengths-based approach.

Method

Participants

Participants were 4654 undergraduate students enrolled in one of six universities in the United Sates (between 434 and 1020 students participated at each university). Five of the six universities are public universities, and the universities are located in the Midwest, Southeast, and Northwest regions of the United Sates. Participants ranged in age from 18 to 29 years ($M = 19.07$, SD = 1.34) and approximately two thirds were female (70.0%, $n = 3258$). The majority (81.0%) of participants self-identified as White; the remaining participants self-identified as either Asian (6.2%), Black (7.1%), Native Hawaiian/Other Pacific Islander (0.4%), American Indian/Alaska Native (0.5%), or Biracial/Multiracial (4.8%); and 10.1% of participants self-identified as Hispanic or Latino. Most participants (58.4%) were in their first year of college; the remaining participants were in their second (21.9%), third (12.6%), fourth (7.1%), or other (0.1%) year of college.

Procedures

This study was approved by the local Institutional Review Board (IRB) at each university, with the individual study protocols specifying that data would be aggregated across sites for analyses and dissemination. Students enrolled in introductory psychology (general education) courses were able to participate in a research study (or studies) to fulfill a course requirement (or, alternatively, to complete an alternative assignment such

Table 2 Descriptive statistics for subscales for the full sample

	M	SD	Skew	Kurtosis	α
Competence					
Academic (6 items)	8.307	1.032	−0.513	−0.514	0.70
Social (6 items)	8.340	1.425	−0.368	−0.895	0.74
Grades (1 item)	10.156	1.751	−1.036	1.486	–
Confidence					
Self-worth (6 items)	9.162	.678	−0.587	−0.176	0.89
Positive identity (6 items)	9.456	1.341	−0.559	−0.294	0.84
Connection					
Family (6 items)	9.669	.831	−1.252	1.437	0.88
Community (5 items)	8.127	2.286	−0.151	−0.902	0.83
Peer (4 items)	10.278	1.110	−0.902	0.291	0.93
School (7 items)	8.445	1.215	−0.247	−0.435	0.92
Character					
Valuing diversity (4 items)	9.036	1.209	−0.573	−0.066	0.79
Social conscience (6 items)	9.969	1.236	−0.842	0.236	0.91
Personal values (5 items)	10.278	1.014	−0.994	0.742	0.87
Conduct behavior (6 items)	8.922	0.780	−0.463	−0.405	0.61
Caring					
Caring 1	9.924	1.110	−0.802	0.396	0.83
Caring 2	9.894	1.110	−0.751	0.222	0.81
Caring 3	9.903	1.143	−0.763	0.161	0.84

$N = 4654$. In the present study, all subscale item responses were rescaled to a 0–12 point scale according to the PYD scoring protocol (Lerner et al. 2010)

as a brief paper). Students were able to choose from a number of studies and could choose to participate in this study if they were ≥18 years old. Procedures varied slightly based on normative practices at each institution. At five of the sites, this study was an anonymous online survey. Specifically, after signing up for the study in the Sona system (an online survey management tool commonly used on college campuses), participants were directed to the survey in Qualtrics where they first read an information sheet describing the study and providing contact information of the local investigator, IRB, and student counseling center. If the participant chose to continue, they were then directed to the survey, and after completing the survey, automatically received course credit in Sona for their participation. At the sixth university, participants were given an individual timeslot for coming to the investigator's laboratory, and after providing informed consent in-person, completed the same Qualtrics survey as participants at the other five universities on their own time. They were similarly granted course credit for participation.

Measures

The Positive Youth Development "Five Cs" questionnaire for grade 8–12 (PYD-5C; Bowers et al. 2010; Lerner et al. 2005) was adapted to measure PYD in the college context. The PYD-5C was developed in part by collating items from four previously established measures: the Profiles of Study Life-Attitudes and Behaviors Survey (PSL-AB; Benson et al. 1998), the Self-Perception Profile for Adolescents (SPPA; Harter 1983, 2012), the Peer Support Scale (Armsden and Greenberg 1987) from the Teen Assessment Project Survey Question Bank (Small and Rodgers 1995), and the Eisenberg Sympathy Scale (Eisenberg et al. 1996). The PYD-5C is a self-report measure comprised of 16 subscales that serve as indicators for each of the Five Cs (competence, confidence, character, connection, caring). Slight modifications were made to a subset of items in the present study to be relevant to college students ("some teenagers…" was changed to "some people…"; "when I am an adult…" was changed to "looking ahead…"). Scale scores were measured by the mean sum of items with reverse coding for relevant items. All items were rescaled from 0–12 according to the PYD scoring protocol (Lerner et al. 2010). Detailed information regarding the measurement of each of the Five Cs is presented in Table 1; and psychometrics for the present sample are presented in Table 2.

Criterion Validity

Depressive Symptoms

The depressive symptoms subscale of the Depression Anxiety Stress Scales-21 (DASS-21; Antony et al. 1998; Lovibond and Lovibond 1995) was used to assess the degree of depressive symptoms. The depressive symptoms subscale consists of seven items (e.g., "I felt downhearted and blue"). Participants respond to each item in reference to the past week using a four-point scale (0 = did not apply to me at all, 3 = applied to me very much or most of the time); higher scores indicate greater depressive symptoms (mean item ratings for the present sample were $M = 0.55$ ($SD = 0.61$). The DASS-21 demonstrates high reliability and is widely accepted as being valid for use with college-aged participants (Antony et al. 1998; Sinclair et al. 2012). In the present study, Cronbach's α was 0.90.

Anxiety Symptoms

The anxiety subscale of the DASS-21 (Antony et al. 1998; Lovibond and Lovibond 1995) was used to assess anxiety symptom severity in the present sample. The anxiety subscale consists seven items (e.g., "I was worried about

situations in which I might panic and make a fool of myself"). Participants respond to each item in reference to the past week using a four-point scale (0 = did not apply to me at all, 3 = applied to me very much or most of the time); higher scores indicate greater anxiety symptoms (mean item ratings for the present sample were $M = 0.48$ (SD $= 0.51$). In the present study, Cronbach's α was .81.

Emotion Dysregulation

The Difficulties in Emotion Regulation Scale (DERS; Gratz and Roemer 2004) is a 36-item scale that measures difficulties in one's awareness and understanding of emotions, acceptance of emotions, and the ability refrain from impulsive behavior when experiencing negative emotions (e.g., "When I'm upset, I believe that I will remain that way for a long time"; "When I'm upset, I become irritated at myself for feeling that way"). Items are rated on a 5-point scale (1 = almost never to 5 = almost always); higher scores indicate greater emotion regulation difficulties. The DERS has shown high internal consistency and good test-retest reliability over 4–8 weeks (Gratz and Roemer 2004). The total DERS score was used for analyses ($\alpha = 0.91$; mean item rating, $M = 2.39$ (SD $= 0.63$).

Analytic Strategy

Survey Validity Checks

Prior to running primary analyses, data were screened for invalid responses (see Becker et al. 2018 for a thorough description of these procedures). To improve the quality of participant responses, an instructional manipulation check (IMC; Oppenheimer et al. 2009) was used to measure whether participants read the instructions carefully. "Trap" questions were also used to detect individuals who were quickly responding to survey questions without sufficient attention to item content. In addition, one question was included at the end of the full survey that asked participants the following: "How much effort did you put into this study from 0 to 10 (0 = not much effort at all, 5 = moderate effort, 10 = my best effort)? To ensure the validity of responses, a threshold was set of 50% accuracy or higher for the "trap questions" and a self-reported effort rating of 5 or higher. Of the 4955 participants in the initial sample, 4679 (94%) answered at least 50% of the "trap" questions correctly AND reported an overall effort of at least 5. Of these 4679 participants, an additional 25 (0.05%) were excluded due to missing all PYD items, resulting in a final sample of 4654 participants in this study.

Missing data rates were negligible (0.1–0.2%) across all study variables and were accounted for by estimating models with maximum likelihood estimates. Further, all

Likert-type indicators were treated as continuous using aggregated subscales similar to previous PYD work (e.g., Bowers et al. 2010; Phelps et al. 2009). A recent simulation study suggests that doing so results in negligible bias when the data contain a sufficient number of response options (Rhemtulla et al. 2012).

Primary Analyses

All analyses were conducted in Mplus version 8 (Muthén and Muthén 1998-2017). The skewness and kurtosis values for the individual subscales of the PYD measure ranged from −0.15 to −1.25, and −0.90 to 1.54, respectively, demonstrating sufficient univariate normality (Curran et al. 1996). Thus, the results using ML estimation for the CFA models are reported. First, a number of CFA models were specified. To examine whether the PYD-5C factor structure that has been validated in adolescents (Bowers et al. 2010; Phelps et al. 2009; Holsen et al. 2017) held for emerging adult college students, confirmatory factor analyses (CFA) were conducted. The fit of five different models were examined based on previous model conceptualization (Lerner et al. 2005; Phelps et al. 2009; Bowers et al. 2010; Conway et al. 2015): (1) one factor general model; (2) five correlated factors reflecting the Five Cs of PYD: competence, confidence, character, connection and caring; (3) higher-order factor model with 5 factors loading onto a general PYD factor; (4) higher-order factor model with correlated residuals as modeled by the creators of the PYD (e.g., Jelic et al. 2007; Conway et al. 2015); and (5) a bifactor model with a general PYD factor and five specific factors. In the higher order factor model, the 16 subscales loaded only on their respective primary factors for the five Cs, and these five C factors loaded on a single secondary general factor similar to the original structure of the Five Cs of PYD (Bowers et al. 2010; Lerner et al. 2005; Phelps et al. 2009). The bifactor model was structured following recommendations by Eid and colleagues (2017) such that each indicator loaded on a general factor and also their own respective specific factors of competence, confidence, character, connection, and caring, while these five specific factors were not assumed to be independent from each other and permitted to correlate as part of the bifactor model (S·1-1; Eid et al. 2017, also referred to as a "nested-factor model"). As a modification of the traditional bifactor model, in the bifactor (S·1-1) model, one variable (i.e., social competence in the present study) serves as the reference indicator for the general factor (g) and does not load onto a specific factor, making the general and specific factors well-defined and better able to take item heterogeneity into account (Eid et al. 2017). Further, in a bifactor model, the global dimension (i.e., PYD) is uncorrelated with all specific factors (i.e., Five Cs).

To ensure a stringent test of measurement, the full sample was randomly split into two samples (Sample A and Sample B). The best-fitting model from Sample A was then repeated with Sample B; this approach ensures that the items and factor loadings for each factor demonstrates structural replicability (Osborne and Fitzpatrick 2012). Finally, the factor loadings were examined in the full sample, which was then subjected to multi-group analysis where the factorial invariance of the model was tested across sex groups. The full sample was also used in analyses examining criterion validity (associations between the Five Cs factors with emotional functioning).

Common guidelines for acceptable model fit (i.e., CFI and TLI ≥ 0.95, RMSEA ≤ 0.08, and SRMR ≤ 0.10; Hu and Bentler 1999; Marsh et al. 2005) were used to evaluate the fit of the structural equation models specified to examine the Five Cs of PYD. When comparing the relative fit of two competing models, the Akaike Information Criteria (AIC) was also used with the lower AIC value indicating the preferred model. Statistical differences between nested models (i.e., five-factor and nested bifactor) were tested using the difference in chi-square values and differences in approximate fit indices. Factor loadings were assessed for statistical significance at the $p < 0.01$ level.

We assessed the explained variance of the general and specific factors by calculating the explained common variance (ECV) and the omega hierarchical (ω_H; see Reise et al. 2013, for an overview of these coefficients) to assess the descriptive model-based reliability estimates for the general factor and specific factors (Reise et al. 2013; Zinberg et al.). The ECV is computed taking "the sum of the squared loadings for that factor divided by the sum of all squared factor loadings (the common variance) for the model" (Brouwer et al. 2013, p.139). The ω_H is the unique variance in scores that was due to the general *or* specific factor. Comparing the reliability coefficients of the general PYD factor and the specific 5 C factors provides information on the reliability of specific factor sum scores (Reise 2012).

Measurement Invariance

Multi-group CFA was conducted to examine measurement invariance of the preferred bifactor model by sex, where more restrictive models were compared to less restrictive models. First, the model is fitted to both groups (males and females) separately to establish baseline model fit of the hypothesized model. Next, a series of hierarchically nested factor structures were fit: (1) an unconstrained model to assess configural invariance or "invariance of form" by allowing the same set of subscales to form a factor in each group while allowing all model parameters to be freely estimated; (2) a constrained model to assess metric invariance by constraining the factor loadings to be equal across

sex; and (3) a constrained model to assess scalar invariance by constraining the factor loadings and the intercepts to be equal across sex groups. Measurement invariance is supported when constrained models do not provide poorer fit as indicated by the (a) statistical significance of the chi-square difference test, (b) change in approximate fit statistics, including ΔCFI < 0.010, ΔRMSEA < 0.015 for both factor loadings and intercepts, and ΔSRMR < 0.030 for factor loadings and <0.010 for intercepts, and (c) magnitude of difference between the parameter estimates (Brown 2006; Cheung and Rensvold 2002; Chen 2007).

Criterion Validity

Finally, criterion validity analyses were conducted using latent regression analyses with the full sample to examine associations between the PYD and residual Five C factors with emotional functioning including depressive symptoms, anxiety symptoms, and emotion dysregulation. In separate models, depressive symptoms, anxiety symptoms, and emotion dysregulation were added as continuous outcome variables to the bifactor measurement models to assess the unique associations of the 5Cs and general factor with emotional functioning. These analyses also controlled for key demographic covariates including sex, age, race/ethnicity (i.e., dummy coded for White and non-White), and university.

Results

Validation of the PYD Five Cs Model

The mean (SD) scores for the 16 PYD subscales are shown in Table 2. Model fits are summarized in Table 3. First, the one-factor model indicated very poor fit (see Model A). Next, the five-factor correlated model indicated poor fit (see Model B). All of the specific factors in the five-factor correlated model correlated strongly with each other, with latent correlation coefficients ranging from $r = 0.212$ between Confidence and Character to $r = 0.748$ between Competence and Confidence. The theoretically based second-order factor structure of PYD (Lerner et al. 2005; Phelps et al. 2009) with no correlations of residuals between indicators failed to meet the recommended criteria for adequate model fit (Model C). Next, as in previous studies (Bowers et al. 2010; Conway et al. 2015; Phelps et al. 2009), correlations were included between Harter measure subscales due to shared method variance, but the model again failed to meet the recommended criteria (Model D). Both variations of the higher order models exhibited inadequate or poor fit. The results also suggested that imposing a higher-order PYD structure fit was significantly

Table 3 Confirmatory factor analysis of the five Cs measure of PYD in sample 1 ($N = 2328$)

Model	χ^2	df	RMSEA	90% CI	CFI	TLI	SRMR	AIC
A. One-factor	4885.417	104	0.141	0.138, 0.144	0.582	0.518	0.112	60675.844
B. Five correlated factors	1310.451	94	0.075	0.071, 0.078	0.895	0.866	0.062	57317.877
C. Second-order	2159.260	99	0.095	0.091, 0.098	0.823	0.785	0.094	58156.686
D. Second-order with correlated residuals	1997.332	93	0.094	0.090, 0.097	0.836	0.789	0.089	58006.758
E. Bifactor	533.597	80	0.049	0.046, 0.054	0.960	0.941	0.035	56372.024

df degrees of freedom, *RMSEA* root mean square error of approximation, *CI* confidence interval, *SRMR* standardized root-mean-square residual, *CFI* comparative fit index, *TLI* Tucker-Lewis index, *AIC* akaike information criteria, *model A* one factor, *model B* five factor model without second-order general factor, *model C* five factor model with second-order general factor, *model D* Correlated residual errors between Harter subscales due to shared method variance (Bowers et al. 2010; Conway et al. 2015; Phelps et al. 2009); Model E: Bifactor model

All chi-square values are significant at $p < 0.001$

worse than a model without the higher-order PYD construct even after relaxing several model constraints suggested by high modification indices (e.g., allowing residual covariances among specific Cs; $\Delta\chi^2$ (1) = 686.880, $p < 0.001$).

The bifactor model provided good fit, with the lowest chi-square value, lowest AIC value, and good RMSEA, CFI, and TLI values, χ^2 (80) = 533.597, CFI = 0.960, TLI = 0.941, RMSEA = 0.049 [90% CI: 0.046–0.054], SRMR = 0.035. A chi-square difference test confirmed that the nested bifactor model fit the data better than the five-factor correlated model, $\Delta\chi^2$ (14) = 973.854, $p < 0.001$. The AIC for the bifactor model was substantially lower than the AIC values for the other three models (see Table 3), further indicating better fit for the bifactor model. This final bifactor model was replicated in Sample B, which also demonstrated adequate model fit, χ^2 (80) = 551.366, CFI = 0.959, TLI = 0.939, RMSEA = 0.050 [90% CI: 0.046–0.054], SRMR = 0.035. Further, the bifactor model demonstrated similarly adequate model fit with the full sample ($N = 4654$), χ^2 (80) = 1012.400, CFI = 0.960, TLI = 0.939, RMSEA = 0.050 [90% CI: 0.047–0.053], SRMR = 0.035. The standardized factor loadings and latent correlations among the 5 Cs for the bifactor model for the full sample are presented in Table 4 ($N = 4654$).

Standardized factor loadings suggested that the general PYD factor was indicated by items from all Five Cs. The residual Five C constructs were also indicated by nearly all of their respective indicators, although the conduct behavior item did not meaningfully load onto the residual Character factor. In addition, the Confidence items loaded weakly onto the residual Confidence factor, suggesting that these indicators may be best conceptualized under global PYD. Further, Connection to Peers loaded weakly onto the residual Connection factor, suggesting that the residual Connection factor emphasized Connection to other ecological resources (family, school). Replicating previous findings from the 4-H Study that examined the bifactor structure of the Five Cs of PYD in adolescence, the present bifactor model results also suggested

significant correlations among several Cs. The highest correlations between residual C factors were between Character and Confidence ($r = 0.872$), Connection and Confidence ($r = 0.637$) as well as Character and Caring ($r = 0.669$), suggesting that emerging adults who rate themselves as being well-connected also rated themselves as having high self-confidence, and those who rate themselves as having high values of character also rated themselves as caring, even after controlling for inter-individual differences in PYD. Competence and Confidence were also correlated with each other ($r = 0.296$), while Character displayed low correlations with Competence ($r = 0.079$) and Connection ($r = 0.178$).

Common variance accounted for by the general PYD factor was 79%. The specific 5 C factors accounted for between 0.2% and 9% (see Table 4). The latent factor reliability coefficients (amount of true score variance) for the PYD and specific 5 Cs is also presented in Table 4. Specifically, the ω_H values indicate the amount of unique variance in scores that was attributable to the general or specific factor. The general PYD factor accounted for 70% of the variance after controlling for the five specific factors. For the specific factors, ω_H values (after partitioning out variability attributable to the general factor) ranged from 0.01 to 0.09 (see Table 4), indicating that when examined in a bifactor structure, the PYD factor predominantly reflects one common source even when multidimensional factors are present (Reise 2012).

Measurement Invariance Across Sex

To determine whether the 5 Cs of PYD factor structure varies systematically by sex, the measurement invariance of the bifactor solution was evaluated by examining configural, metric (weak), and scalar (strong) invariance (see Table 5). Preliminary examination of model fit for the baseline model was good for both males, χ^2 (80) = 399.608, CFI = 0.954 TLI = 0.930, RMSEA = 0.054 (90% CI = 0.049 to 0.059), SRMR = 0.036; and females, χ^2 (80) =

Table 4 Standardized factor loadings (standard errors), latent correlations, explained common variances, and reliability coefficients for the Bi-factor model of positive youth development

Subscales	G	Character	Competence	Confidence	Connection	Care
Character	–	–	0.079*	0.872***	0.178***	0.669***
Social conscience	0.309 (0.032)	0.876 (0.015)	–	–	–	–
Conduct morality	0.378 (0.020)	0.084 (0.024)	–	–	–	–
Personal values	0.411 (0.025)	0.593 (0.019)	–	–	–	–
Valuing diversity	0.236 (0.027)	0.627 (0.016)	–	–	–	–
Competence	–	–	–	0.296***	0.062	−0.035
Academic	0.288 (0.025)	–	0.498 (0.016)	–	–	–
Grades	0.225 (0.028)	–	0.654 (0.021)	–	–	–
Social	0.522 (0.019)	–	–	–	–	–
Confidence	–	–	–	–	0.637***	0.216***
Self-worth	0.554 (0.029)	–	–	0.183 (0.130)	–	–
Positive identity	0.797 (0.021)	–	–	0.113 (0.081)	–	–
Connection	–	–	–	–	–	−0.060
Family connection	0.525 (0.019)	–	–	–	0.586 (0.033)	–
Community	0.536 (0.025)	–	–	–	0.234 (0.028)	–
School connection	0.554 (0.024)	–	–	–	0.552 (0.031)	–
Peer connection	0.512 (0.019)	–	–	–	0.173 (0.028)	–
Caring						
Caring 1	0.344 (0.029)	–	–	–	–	0.665 (0.018)
Caring 2	0.362 (0.028)	–	–	–	–	0.644 (0.019)
Caring 3	0.372 (0.028)	–	–	–	–	0.657 (0.019)
ECV (%)	79.430	9.016	2.693	4.742	0.182	7.459
ω_H	0.697	0.087	0.026	0.045	0.002	0.073

Factor loadings are all statistically significant, $p < 0.001$. Latent correlations among the 5Cs factors are presented on the top-right side.

G global PYD factor, ω_H omega hierarchal, *ECV* explained common variance

*$p < 0.05$

**$p < 0.01$

***$p < 0.001$

556.773, CFI = 0.968, TLI = 0.952, RMSEA = 0.043 (90% CI = 0.040 to 0.047), SRMR = 0.029. Starting with the least restrictive model, configural invariance was examined first to establish invariance of form across sex which showed excellent fit, χ^2 (160) = 1004.424, CFI = 0.957, TLI = 0.939, RMSEA = 0.048 (90% CI = 0.045–0.050), SRMR = 0.031. Next, metric (weak) invariance was tested by constraining factor loadings across sex to assess whether the factor loadings (i.e., the association between the latent factors and their indicators) function similarly across males and females. This specification caused a very small improvement in model fit (RMSEA decreased by 0.003 and CFI remained the same), indicating the factor loadings functioned equivalently across sex. The scalar (strong) invariance model was further specified by fixing individual intercepts to be equal across sex. The strong invariance model caused a small decrease in model fit from the weak invariance model, ΔCFI = 0.008. Differences in CFI between invariance models were below the 0.01 criterion

for comparison, which supported strong measurement invariance across sex.

Criterion Validity with Anxiety and Depressive Symptoms and Emotion Dysregulation

In separate models, anxiety symptoms, depressive symptoms, and emotion dysregulation were added as continuous outcome variables to the bifactor measurement models to assess the unique associations of the 5Cs and general factor with emotional functioning, controlling for sex, age, race/ethnicity, and university site as key covariates (see Table 6). Overall, regression coefficients were generally in the expected directions: negative associations with emotion dysregulation and symptoms of anxiety and depression. The general PYD factor significantly predicted each of the emotional functioning outcomes (βs from −0.40 to −0.63, all ps < 0.001). After controlling for the effect of the general factor, each of the 5C specific factors also demonstrated

Table 5 Model fit statistics for the tests of measurement invariance of general and specific factors of PYD across sex

Invariance testing	Model	χ^2	df	$\Delta\chi^2$	Δdf	CFI	ΔCFI	RMSEA	RMSEA (90% CI)
Invariance of form	(1) Configural invariance	1004.424	160	–	–	0.957	–	0.048	0.045, 0.050
Metric invariance (weak factorial)	(2) Factor loadings invariant	1032.624	184	42.441*	24	0.957	0.000	0.045	0.042, 0.047
Scalar invariance (strong factorial)	(3) Factor loadings and intercepts invariant	1206.754	194	182.632***	10	0.949	0.008	0.047	0.045, 0.050

df degrees of freedom, *RMSEA* root mean square error of approximation, *CI* confidence interval, *SRMR* standardized root-mean-square residual, *CFI* comparative fit index

*$p < 0.05$

**$p < 0.01$

***$p < 0.001$

Table 6 Regression coefficients of the bifactor model predicting emotion dysregulation, anxiety, and depressive symptoms scores

	Emotion dysregulation β (SE)	Depressive symptoms β (SE)	Anxiety symptoms β (SE)
Global PYD	−0.629 (0.019)***	−0.579 (0.018)***	−0.399 (0.018)***
Specific character	−0.074 (0.023)**	−0.102 (0.024)**	0.0048 (0.043)
Specific competence	−0.025 (0.024)	−0.165 (0.023)***	−0.136 (0.027)***
Specific connection	−0.191 (0.036)***	−0.119 (0.022)***	−0.039 (0.060)
Specific confidence	−0.112 (0.029)**	−0.375 (0.035)***	−0.198 (0.034)***
Specific caring	0.138 (0.065)**	0.121 (0.023)***	0.031 (0.080)

All models controlled for relevant covariates including sex (0 = male, 1 = female), age, university, and race/ethnicity (0 = non-White, 1 = White)

PYD positive youth development general factor, β standardized regression coefficient, *SE* standard error

* $p < 0.05$

** $p < 0.01$

***$p < 0.001$

significant effects (with the exceptions that Connection, Character, and Caring were not significantly associated with anxiety). In considering β effects $> |0.10|$, the efficacious Cs (i.e., Confidence, Competence) were associated with lower anxiety (βs = −0.14–0.20, $p < 0.001$) and lower levels of depressive symptoms (β = −0.17 to −0.38, $p < 0.001$) whereas Connection was associated with less emotion dysregulation (β = −0.19, $p < 0.001$). The one exception to the general trend was a weak but positive correlation between Caring and depressive symptoms (β = 0.12, p = 0.007) and emotion dysregulation (β = 0.14, p = 0.011).

Discussion

Assessing the empirical utility of conceptual and theoretical models of PYD across development and into emerging adulthood remains an important task for developmental researchers. Although existing evidence supports the empirical validity of the Five Cs Model of PYD throughout late adolescence (Geldhof et al. 2014; Holsen et al. 2017), further empirical investigation is needed to support such

models in emerging adulthood. The present study fills an important gap in the PYD research by examining whether the Five Cs Model of PYD adequately captures positive youth development in the new developmental context of emerging adulthood. These findings extend prior research by examining the factor structure, isolating sources of variance, and evaluating criterion validity for the overarching measure of PYD as well as the residual C constructs in a large multi-site sample of college students. The original factor structure (higher-order structure) from Lerner et al. (2005) was examined using CFA along with a bifactor model, five-factor model, and unidimensional model. Importantly, the higher-order model did not meet satisfactory model fit criteria in the present sample. Results from the CFAs supported the bifactor model of an overarching measure of PYD as well as the five residual C constructs that represent systematic item variance not directly related to the overarching PYD measure in a sample of emerging adults. The present study extended previous research by establishing measurement invariance across sex and presented evidence of criterion validity of the global measure of PYD. These preliminary findings offered added support

for continued examination of the Five Cs of PYD using a bifactor framework in the in the context of college.

The overall size of the factor loadings for the indicators on the general factor ($M_\lambda = 0.43$) was similar to other CFAs of the bifactor structure of the PYD-5C in adolescents (e.g., Geldhof et al. 2014; Holsen et al. 2017) as well as similar to the factor loadings for the indicators on the specific factors, indicating well-defined factors corresponding to the five dimensions of the Five Cs model. The relative strength of the Five C factor loadings was also consistent with loadings from older adolescent samples (Conway et al. 2015; Geldhof et al. 2014; Holsen et al. 2017). For instance, in Grade 12 of the 4-H Study, the lowest PYD loading for the respective Five Cs has been behavioral conduct, similar to the present study. The factor loadings also reinforce findings presented by Geldhof and colleagues (2014) who found differential relationships between indicators and the global PYD relative to the specific C factors. For instance, in both the Geldhof et al (2014) paper and the present study, the item assessing Peer Connection loaded onto the global PYD factor much more strongly than it loaded onto the residual Connection factor, whereas the other indicators for Connection represented both the specific C and global PYD more equally.

Replicating previous findings from the 4-H Study that treated PYD as a higher-order latent construct (e.g., Bowers et al. 2010), as well as more recent bifactor conceptualizations of PYD (e.g., Geldhof et al. 2014; Holsen et al. 2017), the present bifactor model also suggested variable correlations among the five Cs, with strong correlations between Character and Caring, Character and Confidence, and between Connection and Confidence. The latent correlations between the Five Cs residual factors, although high for a few, were significantly less than 1.0, consistent with previous findings that the Five Cs are separable from one another (e.g., Conway et al. 2015; Phelps et al. 2009). This finding is also in line with a recent bifactor examination of the Five Cs of PYD model in an adolescent sample that found correlations of 0.52 for Character and Caring as well as Connection and Confidence at Grade 12 (Geldhof et al. 2014).

In terms of measurement invariance (i.e., assessing whether the PYD scale performed consistently across sex), strong invariance was observed across sex groups, suggesting that the PYD measure functions similarly across males and females. This supports previous research that has demonstrated measurement invariance of the Five Cs model across males and females in adolescent samples (Conway et al. 2015; Geldhof et al. 2013, 2014).

The global PYD factor explained most of the reliable variance in the model and the specific Five C factors barely captured systematic variance beyond the global PYD factor. This poses great difficulty when attempting to interpret

accurately the residual information assumed by these Five Cs. The results suggest that the Five Cs subscale scores contain values of true score variance (i.e., ωH) below the threshold necessary to be viewed as specific measures of these constructs, independent of the general PYD factor (e.g., Reise et al. 2013, recommend a minimum ωH of 0.50 for specific factors in the bifactor model to be useful with the current values for specific Five Cs being much lower than 0.50). In other words, interpretations of Five C subscale scores must keep in mind that most of the true score variance in these subscales is accounted for by the global PYD factor. This implies that the assessment of PYD in emerging adulthood college students should be based primarily on total scores of PYD. Critically, latent factor reliability coefficients for the global PYD factor and the specific Five Cs has not been previously examined in prior investigations of this bifactor model of the Five Cs of PYD in adolescent samples. The present study addresses this important gap in the empirical support of the Five Cs of PYD by examining this in an emerging adult, college student sample; however future research can certainly benefit from the ability of the bifactor model to isolate the specific variance associated with the Five Cs relative to global PYD. This represents a critical step for confirming the utility of the global PYD factor relative to the Five Cs throughout development. The present study indicates that the Five Cs of PYD may be used to provide researchers or practitioners with a useful index of global PYD for emerging adults in college.

The differential criterion correlations that each of the Five Cs and the global PYD dimension displayed offers support for continued examination of the Five Cs of PYD using a bifactor framework in college settings. Findings suggest that global PYD as well as specific factors of PYD are important indicators of students' levels of depressive symptoms, anxiety, and self-regulation. As illustrated in prior research derived from the 4-H Study (Geldhof et al. 2014; Phelps et al. 2009), the links between PYD and indicators of positive or problematic aspects of development are neither perfectly positive nor negatively correlated, respectively. The varying magnitude of these relations suggests that there are many different patterns of associations among PYD and other indicators of adjustment. The present findings demonstrate that the global PYD measure is a useful measure of thriving in emerging adulthood and of the links between such thriving and other important features of functioning during emerging adulthood and in the context of college.

The Five Cs in College

As adolescents enter emerging adulthood, there are important shifts in essential developmental tasks as well as

contexts (e.g., the transition to college). Thus, it is important to determine whether the Five Cs model of PYD remains a useful tool to capture "thriving" development as individuals enter significant life changes such as starting college or moving out of the family's home for the first time. Findings from the present study indicate that global PYD and the Five Cs not only can be validly assessed in college, but are also associated with key indicators of developmental adjustments including internalizing symptoms and self-regulation, which is in line with Resilience Theory (Connor and Davidson 2003) and consistent with other studies of resilience in the college setting (e.g., Johnson et al. 2015). Of note, these findings support the concurrent associations between global PYD and the Five Cs with emotional functioning; however longitudinal data is needed to support the temporality of these associations. Nonetheless, the present study findings have important implications for the prevention and intervention efforts targeting bolstering students' strengths and resources to contribute to positive youth development in the context of college.

The context of college presents a host of academic and developmental challenges that students have to overcome to succeed and thrive (e.g., time management, coping strategies, forming new social-groups). Many college students report concerns about stress, anxiety, and depression (Bruffaerts et al. 2018). The successful adaptation in the face of these challenges is what defines resilience (Connor and Davidson 2003) and is critical to enhancing positive development (Lerner et al. 2009a, 2009b). The PYD perspective provides a framework for addressing the need for strength-based measures to assess the functioning of young people.

Of note, the present study used a measurement framework that was first established for youth and adolescence (Lerner et al. 2005; Geldhof et al. 2014). The advantages of this approach is that the Five Cs Model of PYD is a well-established measure that has demonstrated longitudinal invariance across development through grade 12 (Geldhof et al. 2013, 2014). Alternatively, it is also possible that there are unique indicators of PYD including particular assets, contextual characteristics, relationships, resources, or opportunities specific to the college context (e.g., increased independence and reliance on peer relationships, decreased support from teachers or parents) or the developmental tasks of emerging adulthood (e.g., moving out of family's home, starting work) that were not necessarily directly captured in the present study. For example, involvement in prosocial activities or engagement with positive peer groups in college such as academic learning communities or volunteer student organizations may provide opportunities for college students to engage in activities that contribute to positive development and subsequently avoid risky behavior that may contribute to poor outcomes including heavy drinking and substance use. Although the present findings support the measurement of PYD in the college context, future work should consider evaluating additional potential measures of PYD that may be specific to emerging adulthood and college.

Overall, these findings suggest that prevention efforts from universities, educators, and school personnel may benefit from fostering the development of students' positive development in learning environments. This approach could take many forms in the college context such as universal screening of PYD during college orientation or conducted by professors at the start of a new semester to identify relative areas of strength and ways to leverage these strengths among students. This information could also be used to inform how to bolster strengths or enhance resources to buffer against risks for students who face greater challenges or seek out services from the school. For example, Johnson and colleagues (2015) recommend using social supports such as peer models of resilience to promote use of academic strategies. Overall, it is critical that efforts to enhance all students' experiences in college emphasize both students' strengths as well as challenges to consider not only how to address challenges or risk behaviors but also build mechanisms that promote resilient development.

Limitations and Future Directions

The present study is not without limitations. Although the current study collected data sampled from six universities spanning several regions of the United States, it should be noted that these findings may not generalize to other young adult populations such as non-students. Despite this limitation, these findings are supported by the PYD 5C Model, as well as other studies that have found similar results when examining this model in adolescent samples (e.g., Bowers et al. 2010; Holsen et al. 2017). Future research should examine the PYD framework with young adults outside the college context to examine important mechanisms of adjustment for emerging adults who are not necessarily college students. It also is also especially important to examine potential differences in how positive development manifests in varying cultural contexts within college including racial/ethnic backgrounds, socioeconomic status, immigration, and family-living situations, as it is likely that PYD does not manifest similarly in all cultures, demographics and settings (Geldhof et al. 2014). The present sample was limited by including predominately White students (81%), and the relatively small sample of minorities did not permit conducting multi-group analyses to examine differences in the model structure across these subgroups. We also do not know what percentage of potentially eligible participants chose to participate or whether certain students were more or less likely to participate in this study.

Participants were recruited through undergraduate psychology courses and were disproportionately female and White compared to the undergraduate population in the United States as a whole (National Center for Education Statistics 2017) and therefore, caution should be made in generalizing these findings. Future research will need to examine the validity of the PYD indicators in diverse populations including those representative of more gender, racially/ethnically, and socioeconomically diverse samples to better understand the generalizability of findings.

The present study did not find support for a higher-order structure of PYD. This finding is line with more recent examinations of the PYD framework (e.g., Holsen et al. 2017; Geldhof et al. 2014); however, it differs from some of the earlier conceptualizations of the PYD 5Cs Model as a higher-order factor model (e.g., Lerner et al. 2005; Phelps et al. 2009). Future work should clarify whether this differentiation observed in the results of the current CFAs supporting a bifactor model reflects a characteristic that distinguishes this framework for older adolescents, emerging adults, and college students relative to younger samples of youth.

Various ecological assets have been identified and included in the 4-H Study of PYD and the present study examined PYD in a college sample using measures consistent with the framework established for youth and adolescence. Future research should consider not only what factors moderate these associations between PYD and the Five Cs with developmental outcomes during college, but also continue to explore how important predictors of positive development in college or emerging adulthood relate to the facets of PYD when modeled in a bifactor structure. Of note, the criterion measures selected in the present study represent critical developmental outcomes for emerging adulthood (i.e., anxiety and depressive symptoms), however it is important for future endeavors to include criterion measures that emphasize positive adaptation such as quality of life, achievements, and positive adjustment. It will be important for future research to provide further insight about PYD in college by including additional indicators as well as outcomes particular to the college context or perhaps uniquely relevant to emerging adults that previously have not previously been measured in the Five Cs Model.

The present study provides preliminary support for the Five C Model of PYD in a college sample; however, these analyses are limited to cross-sectional data and it is important to understand if and how these mechanisms change at different points in development (e.g., the transition to college, during college, and exiting college). Longitudinal evidence is needed to further support the degree to which this framework generalizes across the course of adolescence to emerging adulthood and the college context. It will be important for future work to use longitudinal methods to assess the extent to which PYD can be measured equivalently across adolescence and emerging adulthood by examining longitudinal invariance across these key developmental periods. Despite these limitations, the present study examined how the Five Cs Model validly captures positive youth development in the emerging adult context. Measuring the same constructs in the same way across developmental stages is a prerequisite for studying similarities in development. This study represents a step forward in the application of the PYD framework among college/university students.

Conclusions

Given the growing interest among researchers and practitioners to include PYD as a measure for identifying strengths and indicators of positive development to assess the functioning young people, the need for a tool that can be utilized across different ages and contexts becomes especially important. Emerging adulthood and the transition to college represents a critical developmental context for young people, characterized by change for individuals, their contexts, and their relationships, paired with new challenges and new opportunities for young people, and as such it is especially critical to examine indicators of PYD in this developmental context. The present study contributes to a growing body of literature that has examined the PYD framework across development to better understand the mechanisms and associated predictors of positive adjustment for emerging adulthood. These findings support the bifactor model of an overarching measure of PYD as well as the five residual C constructs in a large sample of emerging adults. Findings also support measurement invariance across sex for this model as well as presented evidence of criterion validity of the global measure of PYD with symptoms of depression, anxiety, and emotion dysregulation. These findings are supported by PYD theory and point to the importance of incorporating a PYD framework in prevention efforts.

Data Sharing and Declaration This manuscript's data will not be deposited.

Compliance with Ethical Standards

Conflict of Interest The authors declare that they have no conflict of interest.

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Declaration of Helsinki and its later amendments or comparable ethical standards.

Informed Consent At five of the universities, a waiver of consent was obtained since no identifying information was collected. A detailed information sheet was presented to participants before starting the survey and stated that "by choosing to move forward with the survey and submitting your completed survey, you indicate your consent for your answers to be used in this research study." The information sheet also provided participants with information about the study, as well as risks/benefits, their rights as participants, that they could choose to not answer any question, and that they could withdraw at any time without penalty. At the sixth university, in person informed consent was obtained.

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Melissa R. Dvorsky Ph.D., was a clinical psychology intern at Cincinnati Children's Hospital Medical Center in the Division of Behavioral Medicine and Clinical Psychology and she is now a postdoctoral research fellow at the University of California, San Francisco. Her research focuses on examining positive social, familial, and individual mechanisms that promote positive adjustment and protect against the risks and negative outcomes associated with adolescence and emerging adulthood. She is also interested in developmental psychopathology of ADHD and building protective mechanisms into preventive interventions with treatment targets that focus on bolstering positive mechanisms to promote resilient development among youth with ADHD.

Michael Kofler Ph.D., is an Assistant Professor at Florida State University. His research focuses on identifying strengths and building capabilities in children with ADHD. Currently, Dr. Kofler's primary research goals are to identify resiliency factors to improve long term outcomes for children with ADHD and develop ADHD-centric, game-based neurocognitive training.

G. Leonard Burns Ph.D., is a professor of psychology in the Department of Psychology at Washington State University. His research focuses on the application of multitrait by multisource by multioccasion measurement models to the study of ADHD, sluggish cognitive tempo, oppositional defiant disorder, and limited prosocial emotions.

Aaron Luebbe Ph.D., is an Associate Professor of Psychology and current Director of Clinical Training at Miami University in Oxford, OH. Rooted within a developmental psychopathology framework and influenced by Bronfenbrenner's ecological model of development, his research focuses on understanding systemic contributors to the etiology and maintenance of youth emotional disorders. His work examines how emotion processes and interpersonal relationships interact to put youth at risk for depressive and anxious symptoms.

Annie Garner Ph.D., is an Assistant Professor at Saint Louis University. Her research focuses on understanding the challenges of transition to adulthood, including adolescence and emerging adulthood, encountered among individuals with ADHD. Areas of study of particular interest to Dr. Garner include driving and the transition to college life.

Matthew A. Jarrett Ph.D., is an Associate Professor in the Department of Psychology at the University of Alabama. His research and clinical interests are in the field of developmental psychopathology, particularly in the areas of attention-deficit/hyperactivity disorder (ADHD) and anxiety disorders. His current research explores the interface of neuropsychological functioning and co-occurring symptomatology in children, adolescents, and emerging adults with ADHD.

Elia Soto is a Graduate Student at Florida State University. Her research interests include examining the developmental trajectory of executive functioning and other neurocognitive abilities in children as well as investigating the interplay between neuro-processes and socio-environmental factors affecting children with ADHD.

Stephen Becker Ph.D., is an Associate Professor of Pediatrics in the Division of Behavioral Medicine and Clinical Psychology at Cincinnati Children's Hospital Medical Center and the University of Cincinnati College of Medicine, Department of Pediatrics. His research focuses on the sleep, sluggish cognitive tempo, and peer functioning in children and adolescents with and without ADHD.