

The Relationship of Core Self-Evaluations and Life Satisfaction in College Students with Disabilities: Evaluation of a Mediator Model

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Abstract

This study examined the factorial structure of the construct core self-evaluations (CSE) and tested a mediational model of the relationship between CSE and life satisfaction in college students with disabilities. We conducted a quantitative descriptive design using exploratory and confirmatory factor analysis and multiple regression analysis. Participants included 97 college students with disabilities majoring in science and technology who received academic and career support services from an urban university on the east coast of the United States. The four CSE traits (self-esteem, self-efficacy, emotional stability, and locus of control) all loaded onto one higher-order CSE variable. Perceived stress, positive affect, and social support were found to completely mediate the relationship between CSE and life satisfaction. CSE was validated as a unidimensional construct in a sample of college students with disabilities. Higher levels of CSE were associated with better life satisfaction because students with high CSE were better at coping with stress, maintaining a positive mood, and building social support than students with low CSE, and this was associated with a higher satisfaction with life. Future research should explore the development of interventions to increase CSE in order to reduce stress, improve affect, and build social support to increase positive psychosocial outcomes such as life satisfaction in college students with disabilities.

Keywords: Core self-evaluations, life satisfaction, college students, people with disabilities

A major goal of psychosocial and quality of life research is to identify and examine factors that contribute to an individual's sense of well-being. In accordance with the positive psychology movement, which seeks to understand and augment positive and adaptive aspects of the human experience rather than focusing solely on symptoms, deficits, and limitations (Seligman & Csikszentmihalyi, 2000), researchers in healthcare and rehabilitation have begun to focus on subjective well-being, including constructs such as life satisfaction, as the preferred outcome in persons with disabilities (Chou, Chan, Chan, & Phillips, 2013). Within rehabilitation, positive psychology emphasizes the impact of positive characteristics of an individual's life (e.g., well-being) and de-emphasizes negative features (e.g., limitations in function) (Chou et al., 2013; Dunn & Dougherty, 2005). The identification of factors that may influence well-being and life satisfaction, and consequently may be targeted for intervention, is of primary importance in rehabilitation research (Chou et al., 2013; Hampton, 2004; Kobau, Sniezek, Lucas, & Burns, 2010; Vestling, Ramel, & Iwarsson, 2005; Vestling, Tufvesson, & Iwarsson, 2003; Wilson et al., 2013).

Despite the recent philosophical emphasis on positive personal characteristics by rehabilitation health researchers, the road to positive adjustment and well-being in people with chronic illness and disability can be long and uncertain. Postsecondary students with disabilities, in particular, often have significant difficulties adjusting to college life. The demands of college, both from an academic and independent living perspective, can be more challenging for students with disabilities than students without disabilities (Field, Sarver, & Shaw, 2003). Many students with disabilities have received significant assistance throughout primary and secondary school from their parents, K-12 educators, and counselors. Once students enroll in college, they must learn to make decisions and advocate for themselves, often for the first time. They must develop organizational and study skills and learn to set both short-term and long-term goals on their own as well as social skills to communicate effectively with instructors, roommates, friends, and dating partners. In addition, the environment of college provides much less structure than that of high school and there may be many more potential distractions than these students are accustomed to. Consequently, all students, and students with disabilities in particular, must acquire the self-determination, persistence, and motivation to successfully navigate the college experience. As a result of the challenges presented by their disabilities and the nature and demands of college life, many students with disabilities are at risk for poor college life adjustment.

Psychosocial and Academic Outcomes in College Students with Disabilities

Many students with disabilities have difficulty adjusting to the independent nature of college life (Frieden, 2003). Like all students, they must learn to deal effectively with all aspects of life, from mundane everyday concerns to financial worries and academic failures. They must cope with attitudinal and structural barriers both on campus and in society at large. Although they may still have the emotional and/or instrumental support of their families, they are forced to assume a much more independent role. In order to be successful, college students with disabilities must persevere in the high-pressure environment of college, despite whatever functional limitations their disabilities may create. Many students find this new life overwhelming, and as a result, they may have problems with psychosocial adjustment and overall well-being.

College students with disabilities often have poorer psychosocial outcomes than students without disabilities. College students with disabilities report higher levels of psychological distress (Blase et al., 2009; Richards, Rosen, & Ramirez, 1999; Shaw-Zirt, Popali-Lehane, Chaplin, & Bergman, 2005; Weyandt, Rice, Linterman, Mitzlaff, & Emert, 1998), higher rates of depressive symptoms (Rabiner, Anastopoulos, Costello, Hoyle, & Swartzwelder, 2008), and lower levels of self-esteem (Dooling-Litfin & Rosén, 1997; Shaw-Zirt et al., 2009) than their peers without disabilities. Students with disabilities have also been found to have poorer social skills (Shaw-Zirt et al., 2009), and to have more difficulty obtaining social support (Kern, Rasmussen, Byrd, & Wittschen, 1999). In addition, Grenwald-Mayes (2002) found that students with disabilities experience a lower level of quality of life than their peers without disabilities. Overwhelmingly, the research suggests that college students with disabilities experience greater distress than students without disabilities.

With respect to academic outcomes, students with disabilities are at risk for poorer academic achievement and increased failure, and are less likely than their peers without disabilities to graduate (Barkley, 1998; Barkley, Murphy, & Fischer, 2008; deFur, Getzel, & Trossi 1996; Frazier, Youngstrom, Glutting, & Watkins 2007; Murphy, Barkley, & Bush 2002; Murray, Goldstein, Nourse, & Edgar 2000; Wolf, 2001). Studies have also shown that college students with disabilities have lower GPAs (Blase et al., 2009; Heiligenstein, Guenther, Levy, Savino, & Fulwiler, 1999) and are more likely to have been on academic probation than students without disabilities (Heiligenstein et al., 1999). Students with disabilities also report poorer study habits, study skills, test-taking strategies, and academic adjustment than

students without disabilities (Lewandowski, Lovett, Coddington, & Gordon, 2008; Norwalk, Norvilitis, & MacLean, 2009; Reaser, Prevatt, Petscher, & Proctor, 2007). Hence, students with disabilities are not achieving the same educational outcomes as their peers (Frieden, 2003). It is, therefore, important for researchers to identify the contributors to well-being and adjustment in college students with disabilities, so that effective interventions can be developed to influence positive psychosocial and academic outcomes.

Core-Self Evaluations and College Students with Disabilities

Rehabilitation health researchers have historically focused on domain-level contributors to well-being in people with chronic illness and disability, such as social support, self-efficacy, and coping skills. An emerging concept in applied psychology and the organizational sciences, which may have potential as a more global positive contributor to subjective well-being in people with disabilities, is “core self-evaluations.” Core self-evaluations (CSE) are conceptualized as the overall, fundamental perception that individuals have about their own worth and capability as human beings (Judge, Locke, Durham, & Kluger, 1998). According to Judge and colleagues, CSE is comprised of four lower-order traits. The first trait included in the CSE construct is self-esteem, which is an overall appraisal of one’s self-worth (Rosenberg, 1965). The next is generalized self-efficacy, which is an evaluation of one’s ability to successfully perform a wide range of tasks (Bandura, 1977). Emotional stability, or low neuroticism, the third CSE trait, is defined as the tendency to feel calm and secure (Eysenck, 1990). The final trait is locus of control, which is the belief that events in one’s life come as a result of one’s own actions rather than by fate or powerful others (Rotter, 1966). According to the CSE theory, these four characteristics combine to explain an individual’s global judgment of the value that they have as a person (Judge, Locke, & Durham, 1997; Judge et al., 1998).

Researchers have begun to evaluate the relationship between CSE and well-being in the general population. For example, in their meta-analysis of 33 studies, Chang et al. (2012) found that CSE had a strong positive relationship with life satisfaction ($r = .54$). Research has also begun to demonstrate mediating effects related to CSE and both life and job satisfaction in the general population (Chang, Ferris, Johnson, Rosen, Tan, 2012). In their review of the literature, Chang and colleagues identified variables such as pursuing self-concordant goals and job satisfaction to mediate the relationship between CSE and overall life satisfaction. These findings suggest, for example, that persons with

high CSE pursue life goals and employment consistent with their interests and values and this, in turn, leads to greater life satisfaction. This type of research is important in order to determine the mechanisms through which CSE affects well-being. Research related to identifying mediators of the relationship between CSE and well-being in college students with disabilities can help identify potential targets for intervention in the university setting in order to ensure student success and well-being.

The purpose of this study, therefore, is to evaluate the factorial structure of the construct “core self-evaluations” in college students with disabilities and test a mediator model in order to begin investigating how CSE may affect well-being (i.e., life satisfaction) in college students with disabilities. Higher educational settings have received increased attention with respect to positive psychology in recent years. In fact, the *Journal of Positive Psychology* published a special issue on positive psychology in higher education settings in 2011 with the goals of initiating meaningful dialogues and providing information regarding the application of positive psychology principles in higher education teaching and administration. Therefore, the application of CSE to the well-being of students with disabilities in higher educational settings is very timely and important.

The mediators chosen for the current study include variables that have been found in previous research to be related to well-being in people with chronic illness and disability. These variables include social support, perceived stress, perceived disability stigma, and positive affect. For example, social support has been found to be related to well-being and adjustment in people with disabilities (Devereux, Bullock, Bargmann-Losche, & Kyriakou, 2005; Kobau et al., 2013). Smedema, Catalano, and Ebener (2010) found perceived stress to be significantly negatively associated with life satisfaction and quality of life in persons with spinal cord injuries. Perceived stigma has been found to be negatively related to quality of life in persons with severe mental illness (Chronister, Chou, & Liao, 2013) and HIV/AIDS (Herrmann et al., 2013). Finally, positive affect has been found to be positively associated with quality of life (van Leeuwen, Kraaijeveld, Lindeman, & Post, 2012) in persons with disabilities.

Although the research on CSE in general is in the relatively early stages, the majority of the mediators chosen for the present study with college students with disabilities have been found to be related to CSE in the general population. For example, a recent study by Yan and Su (2013) found CSE to be related to level of social support in Chinese nurses. With respect to perceived stress, individuals with high CSE have been found to

report fewer life stressors and lower levels of strain (Kammeyer-Mueller, Judge, & Scott, 2009). In addition, Rey, Extremera, and Durán (2012) found that individuals with higher levels of CSE, who also have good emotion regulation, experienced more positive affective states. Finally, as little research to date has addressed CSE and disability, no research has been conducted to study the relationship between CSE and disability stigma. However, as disability stigma is so strongly related to well-being in people with disabilities (Chronister et al., 2013; Herrmann et al., 2013) it is included in this study. Therefore, it is hypothesized that the association between CSE and life satisfaction in college students with disabilities is mediated by social support, perceived stress, perceived stigma, and positive affect.

Method

Participants

Participants were 97 college students with disabilities receiving educational and career development services from the Minority-Disability Alliance in Science, Technology, Engineering, and Mathematics (MIND Alliance) project at Hunter College, City University of New York. Students completed a battery of social-cognitive career theory instruments and college life adjustment measures at intake, and a follow-up survey in 2013. The 2013 survey required approximately 30 minutes to complete. Data for this study were extracted from the 2013 survey in the case files of students participating in the project. The students included 42 (43%) men and 55 (57%) women, ranging in age from 16 to 63 ($M = 26.48$, $SD = 9.75$). Participants included 5 (5%) freshmen, 11 (11%) sophomores, 29 (30%) juniors, 26 (27%) seniors, 14 (14%) graduate students, 11 (11%) individuals who graduated with a STEM degree, and 1 (1%) who was taking a break from school. In terms of race/ethnicity, 32 (33%) students were Black, 25 (26%) were Asian, 23 (24%) were White, 16 (17%) were Hispanic/Latino, and 1 (1%) was American Indian/Alaskan Native. The vast majority of students were single (86; 89%), with four (4%) being married, three (3%) being divorced, and four (4%) cohabitating/living with a significant other. Most students reported sensory disabilities, learning disabilities, and mental disabilities. See Table 1 for specific student demographic information.

Instruments

A variety of instruments were used to measure the variables in this study. In addition to demographic information extracted from the MIND Alliance database, instruments included scales for each of the CSE traits (general self-efficacy, self-esteem, locus of control, and emotional stability), scales for each of the proposed mediators (social support, perceived stress, perceived stigma, and positive affect), and a scale to measure life satisfaction. Technical information about the scales is presented in Table 2.

Generalized self-efficacy. The *General Self-Efficacy Scale* (GSES), which was developed by Schwarzer and Jerusalem (1995), was used to measure generalized self-efficacy. The GSES is a 10-item scale (e.g., “Thanks to my resourcefulness, I can handle unforeseen situations”), with items rated on a 4-point Likert-type scale (1 = *hardly true* to 4 = *exactly true*). It yields a total score between 10 and 40, with higher scores reflecting greater self-efficacy. The seven-week test-retest reliability was reported by Leganger, Kraft, and Rysamb (2000) to be .82. Internal consistency reliability coefficients (Cronbach’s alpha) have been found to range between .79 and .88 (Luszczynska, Scholz & Schwarzer, 2005). The Cronbach’s alpha for GSES in the present study was calculated to be .92.

Self-esteem. The *Rosenberg Self-Esteem Scale* (RSES), which was developed by Rosenberg (1965), was used to measure self-esteem. The RSES consists of 10-items assessing attitudes about oneself (e.g., “I take a positive attitude toward myself”), with items rated on a 4-point Likert-type scale (0 = *strongly disagree* to 3 = *strongly agree*). Total scores range from 0 to 30, with higher scores reflecting greater self-esteem. Studies using the RSES report test-retest reliabilities ranging from .72 to .90 (Robins, Hendin, & Trzesniewski, 2001) and internal consistency reliability coefficients (Cronbach’s alpha) ranging from .77 and .88 (Tomaka, Blascovich, Kelsey, & Leitten, 1993). The Cronbach’s alpha for RSES in the present study was calculated to be .89.

Locus of control. The *University of Washington Locus of Control Scale* (UWLCS), which was developed by the University of Washington’s Department of Sociology for the Beyond High School project (2000), was used to measure locus of control. The UWLCS is composed of 6-items (e.g., “When I make plans, I am almost certain I can make them work”) and items are rated on a 4-point Likert-type scale (1 = *strongly agree* to 4 = *strongly disagree*). Higher scores indicate greater internal locus of control. The Cronbach’s alpha for UWLCS in the present study was calculated to be .56.

Table 1

Demographics of Student Respondents (N=97)

Age	Gender	Year in School	Race/Ethnicity	Marital Status
Range = 16-63	42 (43%) Men	5 (5%) Freshmen	32 (33%) Black	86 (89%) Single
M = 26.48	55 (57%) Women	11 (11%) Sophomores	25 (26%) Asian	4 (4%) Married
SD = 9.75		29 (30%) Juniors	23 (24%) White	3 (3%) Divorced
		26 (27%) Seniors	16 (17%) Hispanic/Latino	4 (4%) Cohabiting with a Significant Other
		14 (14%) Graduate Students	1 (1%) American Indian/Alaskan Native	
		11 (11%) STEM Graduates		
		1 (1%) Taking a Break from School		

Emotional stability. The emotional stability subscale of the *Ten-Item Personality Inventory* (TIPI), which was developed by Gosling, Rentfrow, and Swann (2003), was used to measure emotional stability. The TIPI is composed of ten items and five subscales encompassing the big-five personality types: (1) extraversion, (2) agreeableness, (3) conscientiousness, (4) emotional stability, and (5) openness to experience. Each subscale is comprised of two items. The two items that measure emotional stability are “I see myself as calm, emotionally stable” and “I see myself as anxious, easily upset.” Items are rated on a 7-point Likert-type scale (1 = *disagree strongly* to 7 = *agree strongly*). The TIPI demonstrates adequate levels of convergent and discriminant validity, and internal consistency reliability estimates (Cronbach’s alpha) for the subscales range from poor (.40) to acceptable (.73) (Gosling et al., 2003). The Cronbach’s alpha for emotional stability subscale of the TIPI in the present study was calculated to be .58.

Social support. The *Single Item Measure of Social Support* (SIMSS), which was developed by Blake and McKay (1986), was used to assess perceived social support. The item (“How many people do you have near that you can readily count on for real help in times of trouble or difficulty, such as watch over children or pets, give rides to hospital or store, or help if you are

sick?”) is rated on a 5-point rating scale. Response options are “0,” “1,” “2–5,” “6–9,” or “10 or more” representing low to high practical support. Blake and McKay (1986) reported a strong association between the SIMSS and a composite social support index. Corrigan, Sokol, and Rüscher (2013) also reported a strong correlation between the SIMSS and quality of life of people with serious mental illnesses ($r = .55, p < .001$).

Perceived stress. The *Perceived Stress Scale* (PSS-4), developed by Cohen, Kamarck, and Mermelstein (1983), was used to measure the degree to which participants find their lives unpredictable, uncontrollable, and overloading. The scale contains four items (e.g., “In the last month, how often have you felt that you were unable to control the important things in your life”) rated on a 5-point Likert-type scale (0 = *never* to 4 = *very often*). Scores range from 0 to 16, with higher scores reflecting higher perceived stress. The internal consistency reliability estimate Cronbach’s alpha of .72 was reported for a sample of smoking-cessation program participants (Cohen et al., 1983). The Cronbach’s alpha for PSS-4 in the present study was calculated to be .78.

Perceived stigma. Perceived stigma was measured using Green’s (2003) adapted version of the *Devaluation-Discrimination Scale* ([DDS]; Link, Cullen, Struening, Shrout, & Dohrenwend, 1989). This measure

Table 2

Technical Information about Scales

Variable	Scale	Number of Items (Example Item)	Likert Scale	Reliability and Validity	Cronbach's Alpha for Present Study
Generalized Self-Efficacy	General Self-Efficacy Scale ¹	10 ("Thanks to my resourcefulness, I can handle unforeseen situations")	1 = hardly true to 4 = exactly true	Test-retest reliability = .82 ² Cronbach's alphas = .79-.88 ³	.92
Self-Esteem	Rosenberg Self-Esteem Scale ⁴	10 ("I take a positive attitude toward myself")	0 = strongly disagree to 3 = strongly agree	Test-retest reliabilities = .72-.90 ⁵ Cronbach's alphas = .77-.88 ⁶	.89
Locus of Control	University of Washington Locus of Control Scale ⁷	6 ("When I make plans, I am almost certain I can make them work")	1 = strongly agree 4 = strongly disagree		.56
Emotional Stability	Ten-Item Personality Inventory (Emotional Stability Subscale) ⁸	2 ("I see myself as calm, emotionally stable")	1 = disagree strongly to 7 = agree strongly	Test-retest reliability = .70 ⁸ Cronbach's alpha = .73 ⁸	.58
Social Support	Single Item Measure of Social Support ⁹	1 ("How many people do you have near that you can readily count on for real help in times of trouble or difficulty, such as watch over children or pets, give rides to hospital or store, or help if you are sick?")	"0," "1," "2-5," "6-9," pr "10 or more"	Strong relationships with composite social support index ⁹ and quality of life ¹⁰	
Perceived Stress	Perceived Stress Scale -4 ¹¹	4 ("In the last month, how often have you felt that you were unable to control the important things in your life?")	0 = never to 4 = very often	Cronbach's alpha = .72 ¹¹	.78
Perceived Stigma	Green's ¹² adapted version of the Devaluation-Discrimination Scale ¹³	8 ("Most people in my community feel sad when they meet someone with a disability?")	1 = strongly disagree to 5 = strongly agree	Cronbach's alphas = .73 ¹⁴ -.78 ¹²	.75
Positive Affect	Positive Affect and Negative Affect Schedule ¹⁵	20 ("excited")	1 = very slight or not at all to 5 = extremely	Test-retest reliability = .68 ¹⁵ Cronbach's alpha = .88 ¹⁵	.96
Life satisfaction	Satisfaction with Life Scale ¹⁶	5 ("In most ways my life is close to my ideal?")	1 = strongly disagree to 7 = strongly agree	Test-retest reliability = .82 ¹⁶	.87

Note. ¹Schwarzer and Jerusalem (1995); ²Leganger, Kraft, & Rysamb (2000); ³Juszczyńska, Scholz & Schwarzer (2005); ⁴Rosenberg (1965); ⁵Robins, Hendin, & Trzesniewski (2001); ⁶Tomaka, Blascovich, Kelsey, & Letten (1993); ⁷University of Washington Beyond High School Project (2000); ⁸Gosling, Rentfrow, & Swann (2003); ⁹Blake & McKay (1986); ¹⁰Corrigan, Sokol, & Rusch (2013); ¹¹Cohen, Kamarck, & Mermelstein (1983); ¹²Green (2003); ¹³Jink, Cullen, Struening, Shrout, & Dohrenwend (1989); ¹⁴Green (2007); ¹⁵Watson, Clark, & Tellegen (1988); ¹⁶Diener, Emmons, Larsen, & Griffin (1985)

was used to assess perceived community-level stigma towards individuals with disabilities as a group rather than individual perceptions of personal acceptance. The scale contains eight items (e.g., “Most people in my community feel sad when they meet someone with a disability”) rated on a 5-point Likert-type scale (1 = *strongly disagree* to 5 = *strongly agree*). Scores range from 8 to 40, with higher scores reflecting higher levels of perceived disability stigma. Reliability estimates for the 8-item scale have been reported for a sample of university students with disabilities, with a Cronbach’s alpha of .73 (Green, 2007) and for mothers of children with disabilities, with a Cronbach’s alpha of .78 (Green, 2003), which are consistent with Link et al.’s (1989) original 13 item measure (Cronbach’s α = .76). The Cronbach’s alpha for the DSS in the present study was calculated to be .75.

Positive affect. The positive affect subscale of the *Positive Affect and Negative Affect Schedule* (PANAS), which was developed by Watson, Clark, & Tellegen (1988) was used to measure positive affect. It consists of 20 adjectives that describe mood, such as “excited,” “upset,” “enthusiastic,” and “irritated.” Respondents are asked to rate each item according to the extent that they feel that way, using a 5-point Likert-type scale (1 = *very slight or not at all* to 5 = *extremely*), within an identified time frame selected by the researcher. For purposes of this study, the time frame “General” (how respondents generally feel on the average) was used. Internal consistency estimates (Cronbach’s alpha) with the “General” time frame, have been reported as .88 for the positive affect scale. The test-retest reliability estimate over an eight-week interval was reported to be .68 for the positive affect scale. The Cronbach’s alpha for positive affect subscale in the present study was calculated to be .96.

Life satisfaction. The *Satisfaction with Life Scale* (SWLS), which was developed by Diener, Emmons, Larsen, and Griffin (1985), was used to measure life satisfaction. It is a unidimensional scale consisting of five items (e.g., “In most ways my life is close to my ideal”) rated on a 7-point Likert-type scale (1 = *strongly disagree* to 7 = *strongly agree*). Diener et al. reported a test–retest reliability coefficient of .82 over a 2-month period. In addition, the SWLS has been found to be associated with other measures of subjective well-being, such as the Rosenberg Self-Esteem Scale and the Affect Balance Scale (Diener et al., 1985). The Cronbach’s alpha for SWLS in the present study was calculated to be .87.

Data Analysis

First, in order to determine whether or not the four CSE traits load onto the higher order CSE construct, the dimensionality of the CSE construct was evaluated using exploratory and confirmatory factor analysis. Then, multiple regression analysis was used to test the proposed mediator model. The Statistical Package for the Social Sciences (SPSS) 18.0 was used to perform all analyses except for the model estimations in the factor analysis, which were conducted with AMOS version 18.0 (Arbuckle, 2009).

An *a priori* power analysis was conducted for the regression analysis with five predictor variables, power equal to .80, and an alpha level of .05. Results from this analysis using G*Power 3.1.4 (Faul, Erdfelder, Lang, & Buchner, 2007), a software tool for a general power analysis, suggested that a sample size of 92 would be needed to detect a medium effect size

($f^2 = .15$) (Cohen, 1988). In this study, a medium effect size was expected based on the medium effect sizes observed in CSE studies in the general population (e.g., Chang et al., 2012), as well as studies on the individual CSE traits and proposed mediators in individuals with disabilities (e.g., Smedema et al., 2010). The sample size obtained in the present study, 97, was deemed adequate for the analyses.

Results

Factor Analysis

The four CSE variables (self-esteem, general self-efficacy, emotional stability, and locus of control) were subjected to a principal components analysis. Two preliminary diagnostic analyses were conducted:

- Kaiser-Meyer-Olkin (KMO) analysis resulted in a sampling adequacy of .70, which is greater than the .50 cutoff.
- Bartlett’s Test of Sphericity ($\chi^2 = 87.579$, $df = 6$, $p < .001$) was significant, which also indicated that it was appropriate to proceed with the principal components analysis.

Both the Kaiser Guttman rule (eigenvalue greater than one) and Cattell’s *scree* test indicated a one-factor measurement structure. The one-factor solution accounted for 55% of the total variance. For a one-factor solution, no rotation of the factor structure is necessary, as it is already in its simplest form (Cattell, 1978). The results of the principal components analysis found the factor loadings for the CSE traits to be: self-esteem = .87, emotional stability = .77, general self-efficacy = .76, and locus of control = .54. These values indicate

the strength of the associations between the observed variables and the latent variable (i.e. CSE). The sum of these squared factor loadings, divided by the number of factors, is equal to the total variance accounted for by the model:

$$\frac{.872+.772+.762+.542}{4} = .55$$

A confirmatory factor analysis (CFA) was then conducted to examine the validity of the one-factor solution for the CSE construct. Following the guidelines of Weston, Gore, Chan and Catalano (2008), the goodness of fit of the measurement model was evaluated using the chi-square goodness-of-fit test, the goodness of fit index (GFI), and the comparative fit index (CFI). Models having a non-significant chi-square and GFI and CFI values greater than .95 are considered to have an acceptable fit. Additionally, a Root Mean Square Error of Approximation (RMSEA) value of less than .05 indicates close fit and a value of up to .08 indicates reasonable errors of approximation (Byrne, 2001). The CFA indicated that the one-factor model had an excellent fit with the data, with $\chi^2(2, N=97) = 1.10, p = .58$, n.s., GFI = .99, CFI = 1.00, RMSEA = .01. The CFA results strongly support the one-factor measurement structure of CSE.

Mediator Analysis

Baron and Kenny's (1986) procedure for mediation analysis was used in this study. The three steps involved in this procedure are: (1) regress the independent variable (IV) onto the dependent variable (DV) to show that it is possible that the two variables can be causally linked; (2) regress each mediator onto the IV to show they can also be linked; and (3) regress the IV and the mediators simultaneously onto the DV to determine if the IV is significantly associated with the DV when the mediators are statistically controlled. Step two can be done using bivariate correlations in the case of simple linear regression. In this study, a mediation model of the relationship between CSE (the IV) and life satisfaction (the DV) was tested. Based on research on people with disabilities, it was hypothesized that the association between CSE and life satisfaction in college students with disabilities would be mediated by social support, perceived stress, perceived stigma, and positive affect. The proposed model can be found in Figure 1.

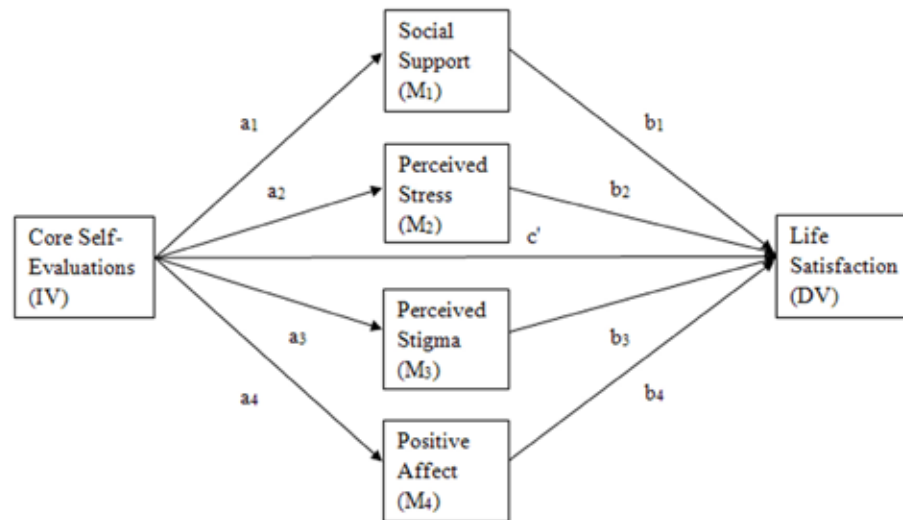
The results of the mediator analysis were as follows:

- Step 1. CSE was found to significantly predict life satisfaction ($\beta = .48, p < .001$), as shown in Table 3.
- Step 2. The associations between CSE and each of the mediators were assessed. As can be observed from the correlation matrix in Table 4, CSE is related to social support ($r = .19, p < .05$), perceived stress ($r = -.60, p < .001$), perceived disability stigma ($r = -.20, p < .05$), and positive affect ($r = .63, p < .001$).
- Step 3. A multiple regression with CSE and the four predicted mediator variables, shown in Table 5, indicated that after entering the four mediators in the regression model ($R^2 = .51, F(5, 91) = 18.71, p < .001$), the relationship between CSE and life satisfaction was reduced to almost zero (from $\beta = .48$ to $\beta = .01$).

These results indicate that the CSE-life satisfaction relationship is almost completely mediated by the mediator variables. Specifically, perceived stress ($\beta = -.44$), positive affect ($\beta = .28$), and social support ($\beta = .18$) are the three significant mediators in the regression model. The association between perceived stigma and life satisfaction was also reduced to almost zero after controlling for the effect of other variables in the model, indicating that perceived stigma does not mediate the relationship between CSE and life satisfaction. These findings suggest the relationship between CSE and life satisfaction can be explained by a lower level of stress and higher levels of positive affect and social support in a sample of college students with disabilities majoring in STEM fields. The revised model can be found in Figure 2.

Discussion

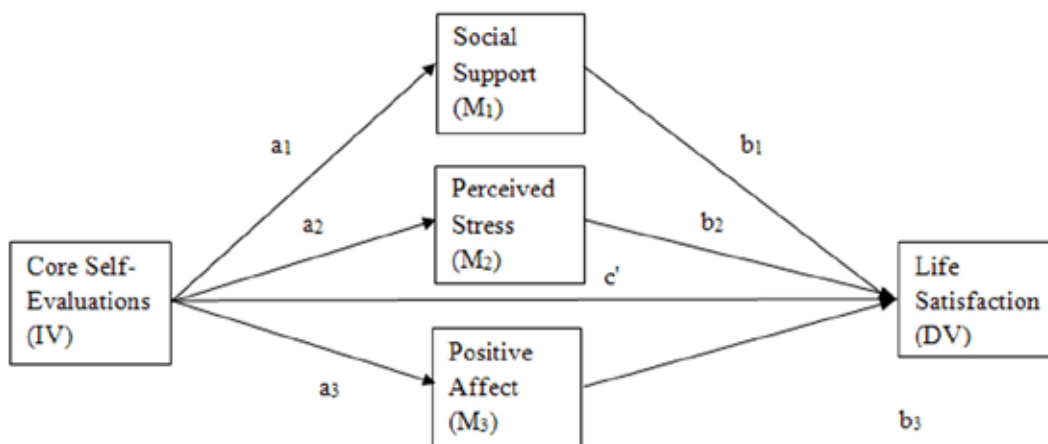
The results of this study support the use of the CSE construct in understanding subjective well-being/life satisfaction in college students with disabilities. Similar to research on CSE and the general population (e.g., Judge, Erez, Bono, & Thoresen, 2002), the four CSE traits loaded onto a higher order personality trait. This finding indicates that the global evaluations that college students with disabilities have about themselves may be more meaningful in understanding their life satisfaction than the four lower-order traits individually. Judge et al. (2002) argue that CSE is a broad, latent trait that is comprised of four traits and that an underlying psychological mechanism causes the traits to be related. Therefore, a high level of CSE is



Legend

IV = Independent Variable
 M_i = Mediator Variables
 DV = Dependent Variable
 a_i = Impact of IV on M_i
 b_i = Impact of M_i on DV
 c' = Direct Impact of IV on DV

Figure 1. The proposed mediation model of the effect of CSE on life satisfaction.



Legend

IV = Independent Variable
 M_i = Mediator Variables
 DV = Dependent Variable
 a_i = Impact of IV on M_i
 b_i = Impact of M_i on DV
 c' = Direct Impact of IV on DV

Figure 2. The final mediation model of the effect of CSE on life satisfaction.

Table 3

Mediator Analysis Step 1 - Simple Regression Analysis for Life Satisfaction (N = 97)

Variable	B	SE B	β
Core Self-Evaluations	2.25	.42	.48***

Note. $R^2=.23$, $F(1,95)=28.14$, $p<.001$

*** $p<.001$

Table 4

Mediator Analysis Step 2 - Correlation Matrix for all Variables (N=97)

	1	2	3	4	5	6
1. Life Satisfaction	.					
2. Core Self-Evaluations	.478***	.				
3. Social Support	.337**	.193*	.			
4. Perceived Stress	-.619***	-.600***	-.085	.		
5. Perceived Stigma	-.132	-.198*	-.126	.207*	.	
6. Positive Affect	.616***	.626***	.416***	-.585***	-.129	.

Note. * $p<.05$, ** $p<.01$, *** $p<.001$

Table 5

Mediator Analysis Step 3 - Multiple Regression Analysis (N = 97)

Variable	B	SE B	β
Core Self-Evaluation	.01	.67	.01
Social Support	1.22	.55	.18*
Perceived Stress	-.81	.19	-.44***
Perceived Stigma	.23	.90	.02
Positive Affect	.20	.08	.28**

Note. $R^2=.51$, $F(5,91)=18.71$, $p<.001$

* $p<.05$, ** $p<.01$, *** $p<.001$

manifested in persons with greater self-esteem, general self-efficacy, emotional stability, and an internal locus of control, and a high level of CSE is associated with higher levels of job performance, job satisfaction, and life satisfaction (Judge et al., 2002). Although CSE has not yet been directly studied related to academic outcomes in students with disabilities, the individual components of CSE (e.g. self-esteem, Blake & Rust, 2002; self-efficacy, Hen & Goroshit, 2014) have been found to be significantly related to academic outcomes such as GPA. Therefore, it is likely that improvements in CSE would also lead to improved academic performance in students with disabilities.

In addition, the mediator model tested in this study provides information about how CSE affects life satisfaction in college students with disabilities. According to the model, college students with disabilities with high CSE are more satisfied with their life because they are able to maintain a lower level of stress, experience a higher level of positive affect/mood, and sustain a higher level of social support. This finding is consistent with research on the relationship between CSE and stress, mood, and social support in the general population. For example, Kammeyer-Mueller et al. (2009), in their meta-analytic review, found that individuals in the general population with high CSE reported fewer perceived stressors and lower levels of strain than individuals with low CSE. This finding, in conjunction with the results of the present study, suggests that a high CSE may serve as a buffer against stress. The buffering effect of CSE may be particularly salient related to the population in the present study. College students with disabilities majoring in STEM fields may be at risk for experiencing significant levels of stress in their daily lives, as they must navigate life as an individual with a disability while simultaneously coping with the rigorous demands of a STEM curriculum. According to Judge and Kammeyer-Mueller (2011), individuals who see themselves as good and competent react more positively to academic and job responsibilities than those who evaluate themselves as less capable. Consequently, it may be important for people with disabilities, and those who experience additional stress due to their disabilities and life circumstances, to develop high levels of CSE in order to effectively manage all of the challenges that they may encounter in life.

In addition, positive affect was also found to mediate the relationship between CSE and life satisfaction in this study. This finding is consistent with research in the general population (Rey et al., 2012) that has found CSE to be related to mood. In addition, in their comprehensive review of studies on quality of life in persons with spinal cord injury, van Leeuwen et al. (2012) reported that 14

out of 17 associations between affect and quality of life were significant. As expected, in the present study, individuals with high CSE were found to experience a more positive mood state and, as a result, they exhibited greater levels of life satisfaction.

We also hypothesized that higher levels of CSE leads to higher levels of social support, and this is one of the reasons why people with higher levels of CSE are more satisfied with life. As expected, social support was found to mediate the relationship between CSE and life satisfaction after controlling for the effect of perceived stress, positive affect, and perceived stigma. This is consistent with previous research that shows that CSE is related to social support (Yan & Su, 2013) and that social support is related to well-being (Devereux et al., 2005; Kobau et al., 2013). Therefore, interventions that address the positive development of CSE in persons with disabilities may lead to increases in their social support networks, which in turn may result in increases to their subjective well-being.

Contrary to our expectations, although higher CSE was associated with lower perceived stigma, perceived stigma was not found to be a mediator of the relationship between CSE and life satisfaction. These results suggest that students with higher levels of CSE are more satisfied with their life because they are better equipped to cope with life stressors, are able to maintain a positive mood in dealing with the vicissitudes of life, and are able to build valuable social support networks. The ability to protect oneself from stigmatizing attitudes toward people with disabilities contributed to the other three mediators without being a significant mediator itself.

Implications for Future Research and Intervention Strategies

Research

Though considerable work has been done in the area of CSE, research on this topic involving persons with disabilities is in the very early stages. As the results of this study demonstrate, CSE holds a great deal of promise as a higher-order contributor to well-being in people with disabilities. Future research should further explore the relationship between CSE and well-being outcomes in persons with disabilities, including acceptance of disability, academic outcomes, job performance and job satisfaction, and quality of life. Moreover, the identification of additional variables that mediate and moderate the above relationship will help researchers determine the mechanisms through which CSE affects well-being. This will aid researchers and clinicians in identifying specific targets for intervention.

It will also be important for researchers to explore how CSE varies among people with and without disabilities, among persons with different types of disabilities, and among members of different cultural or ethnic groups in order to effectively develop and target interventions geared toward improving CSE. Additionally, research in the general population has demonstrated significant relationships between CSE and job satisfaction and other important employment-related variables such as commitment, motivation, productivity, and salary (Chang et al., 2012). Therefore, exploration of the relationship between CSE and long-term employment outcomes leading to the financial independence and community integration of people with disabilities will have important implications for rehabilitation and health services in the future.

Intervention Strategies

No intervention exists that directly addresses CSE in either people with disabilities or the general population. However, current psychosocial interventions related to the four CSE traits can be implemented to improve CSE in clinical rehabilitation practice. The four CSE traits are well studied in the rehabilitation literature and offer targets for intervention. For example, augmenting coping strategies can be helpful at addressing low self-esteem (Smedema et al., 2010). In addition, helping students pursue realistic and attainable goals and learn life skills such as self-advocacy (e.g., being able to arrange for one's own disability accommodations) may help to augment their sense of self-efficacy. Research indicates that the inclusion of all four CSE traits provides better predictive validity across a number of outcomes (Judge, 2009). Clinicians, including those who work in university counseling and disability centers, should therefore develop a multifaceted approach that integrates interventions and self-determination skills training related to all four traits in order to improve a student's overall CSE. In addition, university administrators should be sensitive to the increased stress that students majoring in STEM fields may experience and make additional counseling services or other academic support interventions available in order to minimize the impact of this stress. As mentioned above, further research should address the development of effective interventions geared toward improving the CSE of people with disabilities. Additionally, from a demand-side perspective, employers are looking for employees with disabilities who have positive personality characteristics such as CSE, as they may be more successful employees. Therefore, the importance of CSE in facilitating employment outcomes in students with disabilities once they graduate should be given due consideration.

A specific approach to the facilitation of adjustment in college students with disabilities, especially those in high-stress disciplines such as STEM, would be for instructors and university administrators to approach the educational environment from a universal design (UD) perspective. Historically, UD has been implemented primarily within physical environments. More recently, secondary and postsecondary institutions have expanded the concept as a means to develop more inclusive learning environments. UD in learning and instructional environments, formally, is a set of principles for curriculum development and educational practice that promotes equal access to learning for all students (Rose, Harbour, Johnston, Daley, & Abarbanell 2006). The idea behind UD is that learning is enhanced for all students when information is accessible in a variety of formats and perspectives. According to the Higher Education Opportunity Act of 2008, UD is

a scientifically valid framework for guiding pedagogical practice that: (a) provides flexibility in the ways information is presented, in the ways students respond or demonstrate knowledge and skills, and in the ways students are engaged; and (b) reduces barriers in instruction, provides appropriate accommodations, supports, and challenges, and maintains high achievement expectations for all students, including students with disabilities and students who are limited English proficient. (p. 12)

UD fosters a strengths-based, diversity-sensitive approach toward learning (Rose et al., 2006; Rose & Meyer, 2002; Rose, Meyer, & Hitchcock, 2005). While traditional forms of disability accommodations tend to focus on addressing the individual "problems" and weaknesses of students with disabilities, UD emphasizes the limitations of the learning environment in cultivating a barrier-free space for students with a wide range of abilities. UD approaches emphasize building flexibility and innovation into the curriculum related to student goals, teaching methods, educational materials, and student assessments. Should UD principles be implemented in classroom settings (e.g., materials presented in a variety of formats, group work that values different types of contributions), students with disabilities would be less reliant on disability accommodations, and therefore would feel more confident (i.e., self-efficacy) and in personal control (i.e., locus of control) of their educational experiences. This will, as a result, increase students' overall levels of CSE. These types of approaches will allow students with disabilities in challenging fields such as STEM to reach their maximum potential academically, improve

psychosocial variables such as stress, affect, and social support, such that they may be able to reach their ultimate levels of overall subjective well-being.

Another potential solution to the adjustment difficulties that students with disabilities may experience is for universities and stakeholders to take a more “positive” approach to the overall educational environment. Oades, Robinson, Green, and Spence (2011) discuss how universities strive to elicit excellence and peak performance within their settings. This approach may further disadvantage students with disabilities who may already require accommodations in order to achieve equal access in the classroom alongside their peers without disabilities. This subsequently may lead to the adjustment difficulties described above. In response to the high dropout rates and levels of psychological distress in college students in general, Oades and colleagues argue in favor of “Positive Education.” Positive education is defined as “the development of educational environments that enable the learner to engage in established curricula in addition to knowledge and skills to develop their own and others’ well-being” (p. 432). This “positive university” enables participants to emphasize their strengths in the achievement of their goals in order to increase well-being and decrease negative outcomes such as stress and depression. Campus life can be augmented in such a way that conditions that cultivate well-being are developed, including emphasizing the development of social relationships, fostering creativity, connecting curriculum with personal values, inducing positive mood in the classroom, and promoting flexibility and choice. Oades and colleagues (2011) present a multitude of well-being activities in five key contexts of the university (classroom, social, local community, faculty administration, and residential) with an emphasis on fostering positive emotions, engagement, relationships, meaning, and accomplishment. For example, within the classroom setting, positive emotions can be induced by using humorous anecdotes and music at the beginning of class. Within the social context, engagement can be developed by organizing mindfulness meditation groups. Please see Oades et al. (2011) for many more recommendations on how to implement a “positive” approach in university settings. Such an emphasis on well-being needs alongside of traditional teaching and research activities can enhance the college experience for students and staff, and lead to more positive outcomes. With respect to college students with disabilities, a greater emphasis on well-being and adjustment by universities may help students be able to navigate the challenges of adapting to life on a college campus in a more positive and less stressful way.

Limitations

There are several limitations to this study. First, this is one of the first studies to apply the concept of CSE to disability and, as a result, it is quite exploratory in nature. In addition, a convenience sampling method was used to collect data from college students from one urban university on the east coast of the United States. As the participants of the study were quite high functioning in that they were all majoring in STEM fields, the results of the study may not generalize to the greater population of students with disabilities. In addition, as mentioned above, the rigorous demands of the STEM coursework may have led participants to experience higher levels of stress than other disability groups. This may have affected the participants’ overall psychosocial adjustment and life satisfaction. Additionally, it was not possible to differentiate the impact of the demands of the student’s disability versus the demands of a STEM major. Further, self-report surveys were used to measure the variables in the study. As self-report measures are susceptible to response and social desirability bias, the ability to assess an individual’s true response to the measures may have been limited. Finally, Maxwell, Cole, and Mitchell (2011) demonstrated that cross-sectional approaches to mediation could lead to substantially biased estimates of longitudinal parameters in the case of both partial and complete mediation. Future CSE and disability research should consider the use of other possible mediation models (e.g., longitudinal design) beyond simple cross-sectional models.

Conclusion

Although research on CSE in people with disabilities is in the early stages, this study suggests that it has great potential as a global positive contributor to subjective well-being in people with disabilities. The results of this study showed that the four CSE traits all loaded onto the higher-order CSE variable and that the relationship between CSE and life satisfaction was completely mediated by perceived stress, affect, and social support. This suggests that CSE affects life satisfaction by decreasing stress, improving mood, and fostering social support. Further research on CSE and disability will help identify the most important targets for and methods of campus-based services, in order to help individuals with disabilities achieve the highest levels of CSE and, ultimately, subjective well-being possible.

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