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# The BMSLSS: Measurement Invariance and Latent Mean Differences Across Black and White Early Adolescents

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# THE BMSLSS: MEASUREMENT INVARIANCE AND LATENT MEAN DIFFERENCES ACROSS BLACK AND WHITE EARLY ADOLESCENTS

by

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# ABSTRACT

The Brief Measure of Students' Life Satisfaction Scale (BMSLSS; Seligson, Huebner, & Valois, 2003) is a widely used brief self-report measure of child and adolescent Life Satisfaction (LS). Although acceptable reliability and validity have been demonstrated for the BMSLSS across various youth samples, few cross-cultural comparisons have been performed. Specifically, no studies to date have examined measurement invariance of the BMSLSS across diverse samples of racial groups in the US. The current study explored measurement invariance across Black and White middle school students ($N$ = 1484) from four schools in a southeastern U.S. state through use of multi-group confirmatory factor analysis (MGCFA). Findings provided preliminary support for use of the BMSLSS with Black and White youth, both individually and in comparative research regarding early adolescent LS. Specifically, results supported configural and metric invariance but problems were indicated in the examination of full scalar invariance. Thus, a partial scalar invariance model was identified and demonstrated adequate model fit. Latent mean analyses across the full and partial scalar invariance models indicated that White students reported higher LS scores than Black students. These findings suggest the need for further studies of the generalizability of the findings and the possible determinants of racial differences in the LS of U.S. youth.

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# CHAPTER 1

# INTRODUCTION

Recent shifts in psychological well-being research have promoted the examination of healthy states, such as high overall life satisfaction (LS), rather than the traditional emphasis on the study and treatment of psychological dysfunctions. Specifically, LS is described as the cognitive appraisal of satisfaction with one's life overall (Shin & Johnson, 1978) or regarding specific life domains (e.g., family, school, or peers) and is conceptualized as more than the absence of psychopathological symptomology (Seligman & Csikszentmihaly, 2000). Factors highly valued in society or those that effect the number of favorable events an individual may experience (e.g., race, ethnicity, poverty, educational attainment) have been shown to influence LS (del Mar Salinas-Jiménez, Artés, & Salinas-Jiménez, 2011; Tay, Morrison, & Diener, 2014). Although differences between various groups may reflect true differences in perceived levels of LS, it is important to examine the potential for group differences due specifically to variations in the conceptualization of LS by distinct groups (i.e., racial, ethnic, and gender).

LS may be associated with salient differences across group memberships as cognitive appraisal of satisfaction with life may be influenced by group-specific experiences (i.e., discrimination and access to resources) (Seaton & Yip, 2009; Seligson, Huebner, & Valois, 2003) and cultural values (i.e., individualistic vs collectivist; Diener,

Oishi, & Lucas, 2003; Diener, 2006; Zeng, Ling, Huebner, He, & Fu, 2018). Such differences could impact the response patterns of group members and may suggest needed revisions of the model or associated measure to better reflect group conceptualizations of LS. However, the demonstration of measurement invariance for a given measure of LS across the relevant groups would indicate that findings of mean differences in LS scores between the groups reflect true differences in levels of the construct. However, if measurement invariance is not demonstrated across the groups, mean differences on the relevant measure may reflect the lack of a common conceptualization of LS between the differing groups.

## Literature Review

### Life Satisfaction

Although adult LS has been studied extensively, examination of correlates and associated outcomes of youth LS is an emergent shift in psychological research. Studies indicate child and adolescent LS as a principal predictor of well-being and positive functioning (Suldo, 2016). Furthermore, an advantage of the use of LS as an indicator of positive functioning is its relative stability compared to other components of subjective well-being (Suldo, 2016). Additionally, measures of LS are important in that scores can be used to indicate both psychological ill- and well-being, not solely the presence or absence of problems (Proctor, Linley, & Maltby, 2009).

LS scores are associated with youth functioning and various outcomes. Specifically, LS correlates positively with levels of school engagement and student academic performance (Lyons & Huebner, 2016) and negatively with depression,

anxiety, and social stress (Mahmoud, Staten, Hall, & Lennie, 2012; Gilman, Huebner, & Laughlin, 2000). Furthermore, LS predicts youth outcomes, such as classroom behavior and mental health (Lyons, Otis, Huebner, & Hills, 2014), and it is a protective factor in the face of stressful life events (Suldo & Huebner, 2004). It also demonstrates a positive causal and reciprocal relationship with student GPA (Ng, Huebner, & Hills, 2015).

Very high levels of youth LS are associated with lower levels of depression, negative affect, and social stress (Proctor, Linley, & Maltby, 2010) compared to youth with average and low levels of LS. Furthermore, high LS is also associated with the lowest reported levels of internalizing and externalizing behavior problems and higher levels of academic, interpersonal, and cognitive functioning compared to average and low LS among adolescent youth (Suldo & Huebner, 2006). Research also indicates negative relationships between high LS and youth risk behaviors such as smoking (Piko, Luszczynska, Gibbson, & Teközel, 2005).

Low levels of youth LS are associated with various health risk behaviors including violent behaviors (MacDonald, Piquero, Valois, & Zullig, 2005; Valois, Zullig, Huebner, & Drane, 2001), delinquency (Lyons, Otis, Huebner, & Hills, 2014; Jung & Choi, 2018; Mohamad, Mohammad, Mat Ali, & Awang, 2018), substance abuse (Zullig, Valois, Huebner, Oeltman, & Drane, 2001), and suicidal ideation and behaviors (Valois, Zullig, Huebner, & Drane, 2004). Notably, studies assessing the relations of youth LS and health risks behaviors have also indicated differences across several demographic variables (i.e., race, ethnicity, and gender) (Kerr, Valois, Huebner, & Drane, 2010; Valois, Zullig, Huebner, & Drane, 2009; Valois, Kerr, & Kammermann, 2014).

**Antecedents of youth LS**

Extant studies demonstrate a multitude of presumed antecedents associated with adolescent LS. Personal characteristics (i.e., personality, self-esteem, locus of control), environmental experiences, and demographic differences (i.e., gender, age, race, immigrant status) are associated with youth LS. Specifically, an integrative bio-social-cognitive model of LS suggested by Evans (1994) proposes that personality (e.g., neuroticism and extraversion) and environmental factors (e.g., life stressors) both directly and indirectly contribute to individual differences in LS. The model also suggests that environmental factors (i.e., poverty/wealth, polluted/clean air) may in certain circumstances influence cognitive appraisals of life, with the influence of personal characteristics and environmental factors on LS mediated through cognitive appraisals of an individual's circumstances. The proposed model emphasizes the role of major changes in biosociophysical environments (i.e., loss of job) as influencing cognitive appraisals of life circumstances as well as the moderation of these factors by domain-specific skills, available social support, general social behaviors, and affect. Relations between all factors in the model are thought to be bidirectional in nature. For example, personal characteristics (i.e., self-esteem, locus of control) influence the individual's ability to cope with circumstances/events, and the resultant outcome reciprocally impacts personal characteristics. Furthermore, it could be assumed from the model that environmental conditions/events (i.e., poverty/wealth, discrimination) may also influence levels of characteristics like self-esteem and locus of control that mediate the relations between life events and environmental stressors and LS.

*Personal Characteristics*

Overall, personal characteristics show strong correlations with adolescent LS, with characteristics of personality as one of the strongest predictors of youth and adult LS. Personality characteristics are thought to predispose individuals to levels of subjective well-being as such characteristics are both heritable and relatively stable over the lifetime (see Proctor, Linley, & Maltby, 2009 for review). Findings by Suldo and colleagues (2015) revealed approximately 47% of variance in adolescent LS to be explained by individual levels of the Big Five personality factors, with neuroticism as the strongest predictor. Findings across studies consistently indicate a strong inverse relationship between neuroticism and LS, with correlations in the .40-.60 range in adolescents in the US (Suldo, Minch, & Hearon, 2015; Weber & Huebner, 2015; Lyons, Huebner & Hills, 2016; McKnight, Huebner, & Suldo, 2002), and positive correlations with extraversion, with correlations in the .21-.30 range (Suldo, Minch, & Hearon, 2015; Fogle, Huebner, & Laughlin, 2002; McKnight, Huebner, & Suldo, 2002, Huebner, 1991a). Furthermore, Fogle and colleagues (2002) found social self-efficacy mediated the relation between extraversion and LS, but did not mediate the relation of neuroticism and LS. Strong positive correlations (.40-.60) are consistently demonstrated between LS and global self-esteem (Soares, Pais-Ribeiro & Silva, 2019; Dew & Huebner, 1994; Gilman, Huebner, & Laughlin, 2000; Huebner, 1991b; Neto, 1993), with internal locus of control and LS also demonstrating correlations in the range of .40-.50 (Ash & Huebner, 2001; Dew & Huebner, 1994; Gilman, Huebner, & Laughlin, 2000; Huebner, 1991a).

*Environmental Experiences/Life Events*

Youth LS is associated with the occurrence of positive and negative experiences, which can be identified as acute, chronic, or daily events. Stressful life events have been found to negatively correlate with perceived LS scores (McKnight, Huebner, & Suldo, 2002), with major life events demonstrating effects on LS over and above the effects of personality (Headey & Wearing, 1989). Furthermore, recent increased interest in the study of minor life events (e.g., daily hassles) and LS has revealed that minor events explain unique variance in LS beyond the effects of major life events (positive or negative). For example, McCullough and colleagues (2000) examined the life events and LS of 92 high school students and found daily events to be more influential on youth LS than major life events. Similarly, findings by Ash and Huebner (2001) also suggest stronger direct effects of chronic stressors on adolescent LS compared to the effects of acute negative life events. However, locus of control has also been indicated as a mediator of the relations between chronic stressors and acute negative life events and adolescent LS. Therefore, findings suggest that factors influencing the frequency of positive and negative daily events and locus of control orientation of adolescents may impact differences in the perceived LS of youth, such as belonging to a disadvantaged group (e.g., homeless, minority status).

*Demographic Variables (gender, age, SES, race)*

The demographic variables of gender, age, socioeconomic status (SES), and race, ethnicity have been evaluated extensively. Studies indicate associations between adolescent LS and demographic variables to be modest (see Gilman & Huebner, 2003 or

Huebner, 2004 for a review). Furthermore, such findings are consistently found across various measures of LS including: The Students' Life Satisfaction Scale (SLSS), the Multidimensional Students' Life Satisfaction Scale (MSLSS), the Brief Multidimensional Students' Life Satisfaction Scale (BMSLSS), and the Perceived Life Satisfaction Scale (PLSS) (see Proctor, Linley, & Maltby, 2009 for a review).

Research has traditionally examined gender as biological sex (female and male). Nonsignificant effects have been demonstrated for biological sex across normally achieving adolescents within the US (Huebner, Suldo, Valois, & Drane, 2006; Huebner, Drane, & Valois, 2000), and students with learning disabilities (McCullough & Huebner, 2003). Furthermore, recent shifts in the examination of LS have expanded to include more nuanced measures of gender including experiences of femininity and masculinity, as well as internalized beliefs regarding gender. For example, such burgeoning research has revealed that adolescent males who endorse non-traditional gender-related interests and undesirable traits report lower levels of LS than females who express non-traditional traits (Aubé & Koestner, 1992).

Despite invariance across biological sexes, mixed findings have been demonstrated across studies examining LS levels at different time points across development examined as grade level or age. For example, Huebner and colleagues (2006) found statistically significant differences demonstrated between grade levels in their study of 2,987 adolescents. Specifically, sixth graders reported higher global LS scores than seventh and eighth graders, with small effect sizes of 0.14 and 0.25, respectively. Studies examining biological sex and age have demonstrated nonsignificant differences in LS for high school-aged adolescents in the US (Huebner, Drane, & Valois,

2000; Dew & Huebner, 1994). However, significant differences in LS for both biological sex (Zeng, Ling, Huebner, He, & Lei, 2017) and age have been indicated in studies examining non-US populations and samples that have included both middle and high school-aged students. For example, LS levels were found to decrease with increasing age across a study of 940 Spanish adolescents aged 10 to 15 (Gonzalez-Carrasco, Casas, Malo, Viñas, & Dinisman, 2017) and in a study of 1,274 German adolescents aged 11 to 16 years (Goldbeck, Schmitz, Besier, Herschbach, & Henrich, 2007), with males reporting significantly higher LS scores across both studies.

Mixed results have also been indicated in the relation between adolescent LS and SES. Although nonsignificant differences are reported across some studies, others indicate small to moderate differences in LS (Ash & Huebner, 2001; Dew & Huebner, 1994), where higher SES youth reported greater LS levels (see Gilman & Huebner, 2003 for a review; Seligson, Huebner, & Valois, 2003). Furthermore, homeless youth have reported significantly lower LS than non-homeless youth (Cheng & Lam, 2010; Bearsley & Cummins, 1999), which may indicate that economic differences beyond resources that meet basic needs may not contribute to differences in youth LS (Gilman & Huebner, 2003).

Studies exploring cross-cultural differences in adolescents have principally examined the generalizability of findings from Western cultures to youth findings from other cultures. Differences across overall LS and domain scores have been demonstrated in cross-cultural studies comparing youth from individualistic and collectivist nations. Specifically, differences have been indicated between Chinese and American youth, such that Chinese students reported higher Friend, School, and general LS than American

students (Liu, Tian, & Gilman, 2005). Similarly, differences in domain-specific and overall LS have been demonstrated by Park and Huebner (2005) in a comparison of South Korean and American adolescents. Specifically, the School domain was a significantly stronger correlate of global LS for Korean students only, and the Self domain was a stronger correlate of global LS for American students compared to Korean students. Similarly, a study by Ferguson and colleagues (2011) found that South Korean adolescents demonstrated the lowest School satisfaction and LS compared to Danish and American adolescents, respectively. Results suggested that the amount of autonomy support adolescents receive from authority figures partially mediated cross-national differences in the School domain and LS scores.

Cross-national research examining the acculturation of both first- and second-generation immigrant adolescents has indicated significantly lower LS levels of immigrant youth compared to native adolescents, though the effects of immigration on LS are less pronounced when controlling for family affluence (Stevens, Walsh, Huijts, Maes, Madsen, Cavallo, & Molcho, 2015). Furthermore, acculturation studies have been conducted to assess salient factors for immigrant youth within the US. For example, examination of acculturation among first- and second-generation immigrants (N = 2,774) within the US. has indicated a positive relationship between individualistic values (highly valued in the US) and subjective well-being (r = .27) of immigrant youth (Schwarts et al., 2013). Findings suggest that alignment of personal values with those of the context in which adolescents live has positive implications for youth LS. However, opposite findings have also been demonstrated. In a study of 309 Mexican American middle and high school students, Edwards and Lopez (2006) found Mexican orientation to be a

significant predictor of LS, but Anglo orientation was not a significant predictor of LS. Family factors (parental support) were also indicated as positive predictors of adolescent LS over and above other factors examined (friends, religion, money), which the authors suggested may represent the importance of *familismo*, or the family value of high respect (*respeto*) towards parents, in evaluations of adolescent Mexican Americans' LS.

Furthermore, significant relations between adolescent LS and ethnic identity, or an individual's acceptance of customs from their culture of origin, have been demonstrated. Specifically, findings indicate that the relationship between ethnic minority identity and psychological well-being can be due in part to the individuals' beliefs in the ability of themselves and their groups to effectively respond to experiences of disadvantage due to ethnic minority status (Outten, Schmitt, Garcia, & Branscombe, 2009). Similarly, positive feelings and strong affiliation with one's ethnic group are salient predictors of psychological outcomes in adolescence (Phinney & Ong, 2007). However, scant research has examined the unique contribution of ethnic identity in predicting LS among adolescents (Vera et al., 2012). Studies by Shin and colleagues (2010) and Vera et al. (2012) examined the role of ethnic identity in adolescent LS. Correlation coefficients across both studies revealed significant correlations, however, further analyses across both studies indicated that ethnic identity was not predictive of adolescent LS (Shin, Morgan, Buhin, Truitt, & Vera, 2010; Vera et al., 2012). Notably, a majority of the students in the samples across the studies by Shen et al. (2010) and Vera et al. (2012) were ethnic minorities, which may have played a role in the centrality of ethnic identity among adolescents included in the samples.

Additionally, analyses of racial influences also revealed mixed findings. While there is no universal definition of race, generally, race can be understood as a socially constructed category, in which individuals are classified by physical characteristics (i.e., skin color) and group stereotypes. Often, racial group members are regarded as if each group represented biological differences based on visible physical characteristics (Helms & Talleyrand, 1997). It is important to consider racial identity in research and sensitive clinical practices given the increasing diversity of youth in the US and the role of various demographic factors (i.e., race, ethnicity, and gender) in influencing the level of power and privilege experienced by certain groups over others. Within the US, minority status (e.g., being of color) is historically linked to discrimination, which increases risk for negative outcomes (Krieger, 2012). Research assessing the LS of racial minority youth has examined the associations of these factors as correlates, assessed mean differences across racial groups, as well as explored associations with environmental factors (i.e., neighborhood stress, external developmental assets) and perceived discrimination.

Overall, mixed findings regarding racial differences in overall LS have been reported. The findings indicate both non-significant group mean differences across comparisons of majority (e.g., White) and minority (e.g., Black) racial groups in the US (see Gilman & Huebner, 2003 or Huebner, 2004 for a review; Huebner, Drane, & Valois, 2000; Seligson, Huebner, & Valois, 2003; Huebner, Suldo, Valois, & Drane, 2006) and moderate differences between Black and White youth, with White youth reporting significantly higher LS scores (Huebner, Suldo, Valois, Drane, & Zullig, 2004; Dew & Huebner, 1994; Terry & Huebner, 1995). Notably, it has been argued that mixed findings may be influenced by sample limitations across studies as well as potential confounding

effects of SES on the relationship between SES and LS. Overall, examination of the relations between LS and demographic variables has indicated that such relations are likely mediated by additional factors that may include differences in coping styles, goal orientations, and psychological processes (Diener, Suh, Lucas, & Smith, 1999).

Studies have also examined environmental factors associated with LS scores of Black youth in the US. For example, Valois and colleagues (2018) examined the relationship of neighborhood stress (i.e., experiences of crime, perpetuation of violence, and prevalence of vacant or abandoned buildings over the past year) and LS of Black adolescents. Results indicated a considerable number of Black adolescents reported low levels of LS and high levels of neighborhood stress. Furthermore, the relationship between LS and neighborhood stress was influenced by gender. Gender influenced the magnitude of the relationship between LS and neighborhood stress, such that females showed greater likelihood of associations between low LS and high neighborhood stress, with females who reported high levels of neighborhood stress 3.34 times more likely to report low LS compared to females who reported low levels of neighborhood stress. Research has also indicated associations between the demographic composition of settings, perceived discrimination, and adolescent LS (Seaton & Yip, 2009).

Traditionally, studies that have examined LS in relation to racism, discrimination, and race-related stress among Blacks have focused on adult populations but more recently have explored associations in youth samples. Given that rates of racial discrimination may be on the rise in the US (American Psychological Association, 2016), greater examination of the impact of discrimination on minority youth LS is warranted. For example, Seaton and colleagues (2010) explored the associations of perceived

discrimination and LS across subgroups of Black youth (i.e., African American and Caribbean Black Americans) and found significant differences in LS indicated as a function of the interactions of ethnicity, gender and race. Specifically, older Caribbean Black female adolescents reported lower LS in the context of high perceptions of discrimination when compared to older African American male adolescents. Seaton and colleagues (2010) suggest findings may be due to between-group differences in crystallization of racial identity. Evidence of significant differences between subgroups of Black youth further supports the likelihood of differences in experiences between racial minority (i.e., Black) and majority (i.e., White) youth that may contribute to distinct conceptualizations of LS across racial groups.

Taken together, extant literature supports Evans' (1994) proposed model of LS. Strong correlations are consistently demonstrated between personal characteristics (e.g., personality, locus of control), life events/conditions, and LS, with environmental factors showing effects on LS over and above the effects of personality (Headey & Wearing, 1989). However, an important divergence from Evan's theoretical model is implicated across youth findings for the relation of life events and adolescent LS. While Evans emphasizes the influence of major negative life events in influencing cognitive appraisals, research has indicated stronger effects of daily/chronic events or stressors on youth LS (McCullough, Huebner, & Laughlin, 2000; Ash & Huebner, 2001) compared to acute negative events. Furthermore, locus of control has been implicated as a mediator in the relation between environmental factors and LS. Applying Evan's model, it could be assumed that disadvantaged youth (i.e., homeless, minority status) who are at risk of experiencing greater frequency of negative daily events and an external locus of control

orientation may have an increased likelihood of low LS levels, with likely bidirectional relations between environmental events/conditions and locus of control, both of which inform appraisals of life circumstances.

Notably, demographic variables have demonstrated modest to moderate associations with adolescent LS, with factors of age, SES, race, immigrant status demonstrating mixed findings. Within Evan's (1994) model, mixed findings may be explained by the unique and complex interaction of factors (e.g., discrimination, wealth/poverty) influenced by demographic characteristics that may influence mediators (i.e., self-esteem, locus of control) of the relations between environmental stressors/life events and LS, likelihood of experiencing environmental risk factors, and cognitive appraisals of one's life. Furthermore, while findings across the literature provide a wealth of information regarding adolescent LS and its antecedents, it is important to critically examine current findings that have both influenced and been influenced by theoretical models and measures of LS. Although established measures of LS in the US have demonstrated reliability and validity with predominantly White samples, it is important to examine the psychometric properties of measures across diverse groups in order to confidently interpret and review findings across the literature as such findings are used to drive theory, future research, and potential interventions.

**Measuring LS**

Multigroup confirmatory factor analysis (MGCFA) is commonly used to assess psychometric properties and specifically to test hypotheses about measurement invariance (also referred to as factor invariance, factorial invariance, factor equivalence)

across groups (Kline, 2011). Measurement invariance (equivalence) of an instrument suggests that the same latent factor is measured across samples of interest (e.g., Black and White, etc.), which indicates that respondents across groups interpret the measure in a conceptually similar way and demonstrate similar response patterns (Meade & Lautenschlager, 2004), which would also indicate a lack of evidence for construct bias (Kline, 2011).

Steenkamp and Baumgartner (1998) proposed that interpretation of results from instruments that have not been analyzed for comparative equivalence across groups (i.e., ethnic, racial, and gender) may reflect measurement limitations rather than true between-group differences. However, it is uncommon to have complete equivalence of psychometric properties across groups (Tran, 2009). Thus, analyses examining partial measurement invariance are frequently implemented (Steenkamp & Baumgartner, 1998). If measurement invariance can be demonstrated, then the latent factor scores can be reasonably interpreted and compared across groups (van de Schoot, Lugtig, & Hox, 2012).

Measurement invariance is demonstrated in MGCFA by assessing various levels of measurement invariance, which include configural, metric, and scalar invariance. Each level of invariance builds on the previous level by implementing more stringent constraints of equality on model parameters in order to demonstrate stronger levels of invariance. Configural invariance (i.e., equal form invariance, pattern invariance) is the most basic level of invariance and assesses overall model fit across samples to determine if the same items measure the latent factor across samples. If data do not fit this model, then measurement invariance will not hold at any level of measurement invariance. If

configural invariance is demonstrated, then metric invariance can be used to assess the equivalence of factor loadings across samples. Equivalent factor loadings indicate that the latent factor has the same meaning across samples. Notably, metric invariance of a measure indicates support for comparisons of factor variances and covariances, but does not support the comparison of group means. Justification for comparison of group means is attained through scalar invariance. Scalar invariance requires equivalence of item intercepts across samples, based on the assumption that individuals with the same latent factor value should also have equivalent values across items on which the construct is based. Invariance between models would justify comparison of group means, while non-invariance indicates the potential for measurement bias that may reflect cultural norms or other between-group differences that influence item responses across groups.

*LS Measures*

Multiple scales have been developed to examine the LS of adolescent youth including the Perceived Life Satisfaction Scale (PLSS), Comprehensive Quality of Life Scale (Com-QOL), Satisfaction with Life Scale (SWLS), Students' Life Satisfaction Scale (SLSS), and the Multidimensional Students' Life Satisfaction Scale (MSLSS) (see Huebner, 2004 for a review).

LS measures can be based on unidimensional or multidimensional theoretical models of satisfaction with life. Unidimensional measures reflect interest with individual or group LS as a whole whereas multidimensional measures reflect interest in LS with specific life domains (e.g., family, friends, school). Unidimensional measures assess LS as either a global or general construct through the assumption that a total score can

capture the construct of LS. However, the unidimensional models differ in how the total score is achieved across measures. *General* measures of LS are calculated as a weighted or unweighted aggregate of satisfactions scores across life domains established as critical to LS. However, *global* measures of LS assume that LS can be captured independently of specific domains by using non-domain-free items (e.g., I am satisfied with my life) versus domain-based items (e.g., I am satisfied with my s*chool* life). Furthermore, measures of LS based on multidimensional theoretical models of satisfaction with life instead emphasize the creation of profiles of LS through assessment of specific domains (e.g., family friends, school living environment, and self) under a general LS factor. Measures of LS based on both unidimensional and multidimensional models have provided useful information depending upon the researchers' particular interests.

*BMSLSS*

As interest in the study of student LS has grown, a brief instrument (Brief Multidimensional Students' Life Satisfaction Scale; BMSLSS) based on the MSLSS was developed and is now a commonly used measure of adolescent LS, especially for large-scale surveys and studies with repeated measurements. The BMSLSS consists of five items that measure satisfaction with family, friends, school, living environment, and self, which can be totaled to indicate a general LS score. This instrument is appropriate for use with children ages 8 to 18.

Psychometric properties of the BMSLSS have been assessed with elementary, middle, high school-aged youth (see Huebner, Seligson, Valois, & Suldo, 2006 for a review). For example, findings by Seligson, Huebner, & Valois (2003) for a sample of

middle school students (N = 1,221) revealed acceptable internal consistency reliability, criterion-related validity, and construct validity for the BMSLSS Total score and also indicated convergent and discriminant validity for BMSLSS domain scores. Seligson and colleagues (2003) further examined BMSLSS scores of high school students (N = 46) and found stronger evidence of validity compared to middle school students. Acceptable psychometric properties have also been established for college students (Zullig, Huebner, Gilman, Patton, & Murray, 2005) and youth (aged 11-17) with chronic conditions (e.g., non-progressive muscular or central nervous disorders) (McDougall, Wright, Nichols, & Miller, 2013). Taken together, studies suggest that the BMSLSS is a useful indicator of youth LS for studies in which brevity is an important factor. However, it is also important to note the paucity of literature examining acceptable psychometric properties of the BMSLSS for cross-cultural, racial, and ethnic comparisons in studies of adolescent LS in the US and other countries.

Although a number of studies have evaluated cross-cultural differences in mean scores of LS using such measures as the SLSS and MSLSS, there is scant research using the BMSLSS to assess adolescent LS. Specifically, Abubakar et al. (2016) assessed the measurement invariance of the BMSLSS among adolescents and emerging adults across 23 countries (N = 7,739). The results of multi-group confirmatory factor analysis indicated similar patterns and strengths in factor loadings across countries. However, the results also indicated that scalar invariance was problematic for both adolescents and emerging adults. Overall, the findings of this study suggested the BMSLSS as an appropriate measure for use in cross-cultural research, though the authors cautioned that measurement invariance should still be evaluated in new studies before making mean

comparisons. Furthermore, Zeng and colleagues (2018) assessed the measurement invariance of the BMSLSS in Chinese (N = 2,045) and American (N = 1747) early adolescents and found support for the expected one-factor structure. Multi-group confirmatory factor analysis also indicated full configural invariance, full metric invariance, and partial scalar invariance between Chinese and American students. Lastly, significant differences between Chinese and American early adolescents were revealed in analyses of latent means, with lower LS reported by Chinese early adolescents. Thus, there is evidence that supports use of the BMSLSS in cross-national comparisons identified in the extant literature, but studies have not yet assessed its utility across specific racial groups within nations.

For example, the psychometric properties of youth LS measures with Black adolescent samples need examination in order to ensure the appropriateness of their scores for use with this group. In a recent study, Valois et al. (2019) examined the psychometric properties of the BMSLSS with a large sample (N = 1,658) of Black adolescents (age 13-18). Analyses revealed mean scores that were commensurate with prior literature, adequate internal consistency reliability ($\alpha$ = .78), validity (convergent, divergent, known-groups, and discriminant), and evidence of internal structure (one factor). Overall, findings suggest the psychometric strengths of the BMSLSS for use with Black adolescents. However, studies are still needed to assess measurement invariance *across* racial groups (i.e., Black and White).

**Rationale for Study**

Differences in experiences of racism, discrimination, and race-related stress by Blacks have important influences on psychological well-being compared to Whites in the US (English, Lambert, & Ialongo, 2014; Seaton, 2010; Seaton & Yip, 2009; Gaylord-Harden & Cunningham, 2009). Numerous studies have examined these effects across adults but emerging interest in studies of youth LS are contributing to an increase in diversity-related research. A number of studies have examined differences in LS scores across samples of Black and White youth using various measures of LS and have demonstrated mixed findings. Both non-significant (see Gilman & Huebner, 2003 or Huebner, 2004 for a review) and moderate mean differences have been shown in comparisons of Black and White youth, with White youth demonstrating significantly higher LS scores across studies (Huebner, Suldo, Valois, Drane, & Zullig, 2004; Terry & Huebner, 1995; Dew & Huebner, 1994). Additional factors proposed to influence these include differences in coping styles, goal orientation and psychological processes (Diener, Suh, Lucas, & Smith, 1999), as well as examination of associations with ethnic identity, environmental factors like neighborhood stress, and perceived discrimination. However, scant literature has assessed LS among Black youth and potential measurement limitations, especially for the BMSLSS.

The BMSLSS is a widely used brief self-report measure of child and adolescent LS. Although acceptable reliability and validity have been demonstrated for the BMSLSS Total-scores across samples of middle and high school students (Seligson, Huebner, & Valois, 2003), few cross-cultural comparisons have been performed. Specifically, no

studies to date have examined measurement invariance of the BMSLSS across diverse samples of racial groups in the US.

The current study will contribute novel findings to the literature by assessing measurement invariance of the BMSLSS for Black and White early adolescents living in the US. The demonstration of measurement invariance through the use of multi-group confirmatory factor analysis (MGCFA) will allow for evaluation of latent mean differences across racial groups and potential measurement limitations in comparative research of Black and White early adolescents. Specifically, configural, metric, and scalar invariance across groups would indicate the BMSLSS as acceptable for use in comparative research between Black and White youth, which would support interpretation of findings related to intersectionality, youth outcomes, and effective interventions for Black youth.

**Research Questions**

The purpose of this study was to examine measurement invariance of the BMSLSS across samples of Black and White early adolescents in the US. To accomplish this goal, two research questions were identified.

1. Is measurement invariance demonstrated across samples of Black and White early adolescents for the BMSLSS?

    Literature on adolescent LS has indicated support for a one-factor model of general LS on the BMSLSS (Seligson, Huebner, & Valois, 2003). However, scant research has explored the measurement invariance of the BMSLSS across different groups. Configural and metric invariance have been demonstrated in

cross-cultural studies of the BMSLSS (Zeng et al., 2018; Abubakar et al., 2016), but issues with scalar invariance across studies encourage caution with interpretation of results. Furthermore, despite recent support for the use of the BMSLSS in research with Black adolescents (Valois et al., 2019) there is a need for the assessment of measurement invariance across Black and White youth groups. Given the recent support for the one-factor model of the BMSLSS with a Black adolescent sample (Valois et al., 2019) and measurement invariance findings across cross-cultural studies, it was hypothesized that full configural and metric invariance will be demonstrated in the comparison of Black and White adolescents. However, full scalar invariance may be problematic and partial scalar invariance may instead be observed. Partial scalar invariance may indicate some possible measurement bias in item responses across samples that would encourage caution in interpretation of results in comparison of group means of Black and White early adolescents.

2. Is there a statistically significant difference in LS scores across Black and White early adolescents?

Overall, mixed findings have been reported regarding the relations between race and youth LS. Both non-significant and (see Gilman & Huebner, 2003 or Huebner, 2004 for a review) and moderate differences have been demonstrated. For example, White youth have reported significantly higher LS scores than Black youth (Huebner, Suldo, Valois, Drane, & Zullig, 2004; Terry & Huebner, 1995; Dew & Huebner, 1994). Although psychometric strengths have been demonstrated in use of the BMSLSS with Black adolescents (Valois et al., 2019),

the potential influence of comparative measurement limitations have not been ruled out as factors that may contribute to findings across studies of race in the US. If measurement invariance is demonstrated in the current study, it will be possible to test for mean differences across Black and White early adolescent groups. Although findings of the relations between race and LS have been mixed, a majority of studies indicate non-significant differences between Black and White students. Furthermore, preliminary studies of the BMSLSS have indicated non-significant differences in general LS scores between Black and White early adolescent samples (Seligson, Huebner, & Valois, 2003; Huebner, Suldo, Valois, & Drane, 2006). Based on findings by Seligson et al. (2003) and Huebner et al. (2006), it was hypothesized that the Black early adolescents will report equivalent levels of general LS compared to White early adolescents.

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# CHAPTER 2

# METHOD

## Participants

An archival dataset from four middle schools in a southeastern US state was used in the present study. Although this dataset has been used in prior studies (e.g., Reckart, Huebner, Hills, & Valois, 2017), the present analyses are new. School personnel collected data as part of a school-wide survey of school climate and well-being, with demographic information collected via self-report items.

The sample consisted of 1484 middle school students that included sixth (26.8%), seventh (34.4%), and eighth (37.3%) grade students. The mean age of the students was 12.54 (*SD* = .98), representing a range from 11 to 15 years old. The mean age as 12.54 (*SD* = .98) for Black students and 12.42 (*SD* = .98) for White students. Of the sample, 28.3% were Black, 69.1% were White. Students who identified their race as "other" were included in the original dataset, however, only data from students identifying as Black and White were analyzed in the current study. Socioeconomic status (SES) was measured through self-report of participation in regular school lunch (higher SES) or federal free or subsidized lunch (lower SES). Lower SES was reported by 34.6% of students. Descriptive statistics of the sample are presented in Table 2.1.

## Procedures

Survey administration was standardized, as teachers read scripted instructions and informed students of response confidentiality and right to withdraw at any point. Approval was obtained from the University of South Carolina Institutional Review Board prior to data collection. Researchers accessed data only after identifying information was removed by school personnel.

## Measures

**Brief Measure of Students' Life Satisfaction Scale** (BMSLSS; Seligson, Huebner, & Valois, 2003). The BMSLSS was adapted to address the same dimensions of life satisfaction measured in the longer version of the Multidimensional Students' Life Satisfaction Scale (MSLSS; Huebner, 1994), which is a widely accepted measure of child and adolescent life satisfaction (Proctor, Linley, & Maltby, 2009). The BMSLSS is a 5-item self-report measure, in which students rate satisfaction with family, friends, school, living environment and self. Participants evaluate satisfaction with these domains using a 6-point scale, ranging from 1-*very dissatisfied* to 6-*very satisfied*. Domain scores were summed to create a mean score as a continuous measure of life satisfaction, with higher scores indicating higher general LS. The BMSLSS scale is appropriate for use with 3rd-12th grade youth (Seligson, Huebner, & Valois, 2003; Seligson, Huebner, & Valois, 2005).

A one-factor structure of the BMSLSS has been supported across US samples (Funk, Huebner, & Valois, 2006; Seligson et al., 2005, Zullig, Huebner, Gilman, Patton, & Murray, 2005), including support for a one-factor structure with Black adolescents

(Valois et al., 2019). The BMSLSS Total score has demonstrated acceptable correlations with other validated measures of life satisfaction, including the MSLSS total score with a correlation at 0.66 (Seligson, Huebner, & Valois, 2003), and the SLSS, with correlations ranging from 0.62 to 0.74 (Funk, Huebner, & Valois, 2006; Seligson, Huebner, & Valois, 2003; Seligson et al., 2005). Furthermore, reliability coefficients for the Total score have been reported at 0.75 for middle school students (Funk, Huebner, & Valois, 2006) The BMSLSS demonstrated acceptable reliability in the current study, with an alpha coefficient of 0.82.

**Data Analysis Plan**

Descriptive statistics, factor loadings, reliability, and item-total correlations, confirmatory factor analysis (CFA) and multi-group confirmatory factor analyses (MGCFA) will be conducted using MPLUS for the 5-item version of the BMSLSS.

CFAs will be utilized to assess the factorial structure of the BMSLSS across samples. Due to the high sensitivity of $\chi^2$ to large sample size (Bentler & Bonnet, 1980; Bollen, 1989), other acceptable goodness-of-fit indices will be used. Model fit will be assessed using the following criteria: standardized root mean square residual (SRMR; Bentler, 1995), root mean square error of approximation (RMSEA; Browne & Cudek, 1993; Steiger & Lind, 1980); the Tucker-Lewis index (TLI; Tucker & Lewis, 1973), and the comparative fit index (CFI; Bentler, 1990). Cutoff values considered acceptable for model fit included: SRMR values close to .08 or below, RMSEA values close to .06 or below, and TLI and CFI values close to .95 or greater (Hu & Bentler, 1999).

Measurement invariance across samples will be performed to assess for differences in the BMSLSS conceptualization of the latent factor across Black and White early adolescents. Specifically, the fit indices of three hierarchical models of measurement invariance will be assessed across samples. Configural invariance will be assessed in Model 1 to determine if the same parameters exist across both samples. If configural invariance is demonstrated, then equivalent factor loadings will be examined across samples in Model 2 to assess for metric invariance. If metric invariance is met, then in Model 3 constraints would be placed on equivalence of item intercepts and factor loadings across samples to test for scalar invariance. The ΔCFI index will be examined to assess invariance between the models, with a $\Delta CFI \leq .01$as acceptable evidence of equivalence across groups (Cheung & Rensvold, 2002).

To test latent mean differences in LS, the Black group will be selected as the reference group and the latent mean will be set to zero. The White group will be estimated freely. Difference in Z-scores will be used to indicate that the estimate of equality should be rejected. Furthermore, a higher latent mean for the reference group would be indicated by a positive Z-score, with a lower latent mean indicated by a negative Z-score.

Table 2.1: Descriptive Statistics of Sample

| Demographic Variables | | *n* | *%* |
|---|---|---|---|
| Grade | 6th | 398 | 26.8 |
| | 7th | 511 | 34.4 |
| | 8th | 553 | 37.3 |
| | Missing | 22 | 1.5 |
| Age | 11 | 288 | 19.4 |
| | 12 | 434 | 29.2 |
| | 13 | 547 | 36.9 |
| | 14 | 181 | 12.2 |
| | 15 | 20 | 1.3 |
| | Missing | 14 | 0.9 |
| Gender | Male | 779 | 52.5 |
| | Female | 693 | 46.7 |
| | Missing | 12 | 0.8 |
| Race | Black | 420 | 28.3 |
| | White | 1026 | 69.1 |
| | Missing | 38 | 2.6 |
| SES | Regular Lunch | 821 | 55.3 |
| | Free & Reduced Lunch | 514 | 34.6 |
| | Missing | 149 | 10.0 |

Note: SES = socioeconomic status

# CHAPTER 3

# RESULTS

## Descriptive Statistics, Factor Loadings, and Item-Total Correlations

Sample characteristics and descriptive statistics are provided in Tables 3.1 and 3.2. There was less than 2% missing data between covariances and 11 missing data patterns. Full information maximum likelihood was used to estimate parameters and account for missing data, which was assumed to be missing at random. The mean BMSLSS (5-item) total score for LS was 4.75 for Black students (*SD* = 1.48) and 4.94 for White students (*SD* = 1.27). Table 3.2 includes factor loadings, descriptive statistics, and item-total correlations (ITC) of the BMSLSS for the Black and White student sample.

## Confirmatory Factor Analyses

Fit indices of the BMSLSS are presented in Table 3.3. Results of confirmatory factor analyses indicated an adequate fit for the theorized one-factor model for the Black and White samples ($\chi^2 = 32.97$, $df = 5$, $p = 0.00$); *CFI* = 0.99; *TLI* = 0.97; SRMR = 0.02; RMSEA = 0.06 (*CI* 90: 0.04-0.08). Although a non-significant chi-square is ideal, the significant chi-square obtained in the present analyses is presumed to be resultant of the large sample size.

**Measurement Invariance Across Racial Groups**

Model fit statistics from measurement invariance analyses across Black and White students are reported in Table 3.4. Adequate model fit was demonstrated across samples, which supported the configural validity of the model and indicated that the same items measure the latent factor for both Black and White students. Next, equivalent factor loadings across samples in Model 2 supported metric invariance across samples. ΔCFI between Model 2 and 1 further supported metric invariance across samples.

Item intercepts were then constrained to be invariant across samples in order to test for scalar invariance. Although the scalar invariance model demonstrated adequate values for CFI and SRMR, model fit was not supported by TLI or RMSEA. Furthermore, ΔCFI did not support scalar invariance. As a result, partial scalar invariance was examined.

Because full scalar invariance was not achieved, additional analyses were conducted to better understand the comparability of latent mean differences across samples of Black and White students. Researchers assessed latent mean differences across groups for the 5-item version of the BMSLSS and the abbreviated 4-item version, which included invariant items only. Based on modification indices, the intercepts of item 4 (*MI* = 50.55) were freed for both Black and White students and the partial scalar invariance model yielded a ΔCFI of -.007. Cheung and Resvold (2002) recommend that change in ΔCFI should be less than or equal to -.01, which is a more robust measure than the standard practice of accepting CFI values greater than 0.95 for model fit. In the current study, a ΔCFI of -.007 is indicative of very precise parameter estimates.

Furthermore, the partial scalar invariance model demonstrated adequate values for $\chi^2$, CFI, TLI, SRMR, and RMSEA.

**Latent Mean Difference**

Latent mean differences were analyzed across Black and White students for both the full five-item model and the four-item partial scalar invariant model that represented all invariant items. As shown in Table 3.5, latent mean analysis of the five-item model revealed that White students reported significantly higher life satisfaction scores than Black students ($z = 1.97$, $p < 0.001$). Latent mean analysis of the four-item model also indicated that White students reported significantly higher life satisfaction scores than Black students ($z = 4.41$, $p < 0.001$), as reported in Table 3.6. These analyses support interpretation of latent mean scores across Black and White students of the study sample.

Table 3.1: Descriptive Statistics for Variables

| *Variables* | *M* | *SD* |
|---|---|---|
| Life Satisfaction | 4.89 | 1.32 |
| Satisfaction with Family | 5.04 | 1.25 |
| Satisfaction with Friendships | 5.05 | 1.15 |
| Satisfaction with School | 4.29 | 1.44 |
| Satisfaction with Myself | 4.88 | 1.39 |
| Satisfaction with Where I Live | 5.00 | 1.29 |

Note: Black/White ($n$ = 403/983)

Table 3.2: Descriptive statistics for Black and White Samples

| Item | Loadings | *M* | SD | Skewness | Kurtosis | ITC |
|---|---|---|---|---|---|---|
| Black/White (*n* = 403/983) | | | | | | |
| I would describe my satisfaction with family life as: | 1.000/1.000 | 4.856/5.124 | 1.910/1.359 | -1.251/-1.710 | .863/2.864 | 1.000/1.000 |
| I would describe my satisfaction with friendships as: | 0.795/0.709 | 4.737/5.186 | 1.893/1.050 | -1.142/-1.733 | .607/3.576 | 0.474/0.466 |
| I would describe my satisfaction with school as: | 0.849/0.907 | 4.148/4.358 | 2.161/2.000 | -.559/-0.856 | -.501/-0.036 | 0.484/0.389 |
| I would describe my satisfaction with myself as: | 1.017/1.147 | 4.985/4.844 | 2.085/1.849 | -1.464/-1.301 | 1.192/0.962 | 0.596/0.590 |

| | | | | | | |
|---|---|---|---|---|---|---|
| I would describe my satisfaction with where I live as: | 0.942/0.938 | 4.810/5.076 | 2.074/1.497 | -1.182/-1.546 | .514/1.945 | 0.544/0.552 |

*SD* standard deviation, *ITC* item-total correlation

Table 3.3: Confirmatory Factor Analysis

| $\chi^2$ (df) | CFI | TLI | SRMR | RMSEA (90% CI) |
|---|---|---|---|---|
| 32.969(5) | 0.987 | 0.974 | 0.020 | 0.063 |

*CFI* comparative fit index, *TLI* non-normal fit index, *SRMR* standardized root mean square residual, *RMSEA* root mean square error of approximation, *90% CI* limits of the 90% confidence interval for RMSEA

Table 3.4: Multigroup Analysis by Race

| | $\chi^2$ (df) | CFI | TLI | SRMR | RMSEA (90% CI) | $\Delta\chi^2$ (df) | *P* | Model comparison | ΔCFI |
|---|---|---|---|---|---|---|---|---|---|
| Model 1 (configural invariance) | 42.163 (10) | .985 | .970 | .022 | .068 | -- | -- | -- | -- |
| Model 2 (metric invariance) | 42.163 (10) | .985 | .970 | .022 | .068 | 0 (4) | 1 | Configural vs. Metric | 0 |
| Model 3 (scalar invariance) | 112.045 (14) | .954 | .934 | .045 | .101 | 69.882 (4) | 0 | Scalar vs. Metric | .031 |
| Model 4 (partial scalar invariance) | 58.916 (13) | .978 | .967 | .032 | .071 | 16.753 | | Partial Scalar vs. Metric | -.007 |

*CFI* comparative fit index, *TLI* non-normal fit index, *SRMR* standardized root mean square residual, *RMSEA* root mean square error of approximation, *90% CI* limits of the 90% confidence interval for RMSEA, Δ change in the model

Table 3.5: 5-Item Model Latent Mean Difference

| Black/White ($n$ = 403/983) | Estimate | Standard Error | Z-score |
|---|---|---|---|
| B1 | 1.00/1.00 | 0.00/0.00 | 999.00/999.00 |
| B2 | 0.79/0.72 | 0.07/0.04 | 11.17/17.63 |
| B3 | 0.85/0.90 | 0.07/0.06 | 11.43/16.00 |
| B4 | 0.97/1.12 | 0.07/0.06 | 13.08/20.34 |
| B5 | 0.94/0.94 | 0.07/0.05 | 12.96/19.97 |
| Means | 0.00/0.14 | 0.00/0.07 | 999.00/1.97 |

Table 3.6: 4-Item Model Latent Mean Difference

| Black/White ($n$ = 403/983) | Estimate | Standard Error | Z-score |
|---|---|---|---|
| B1 | 1.00/1.00 | 0.00/0.00 | 999.00/999.00 |
| B2 | 0.79/0.74 | 0.07/0.04 | 11.20/17.90 |
| B3 | 0.85/0.90 | 0.07/0.06 | 11.41/16.10 |
| B4 | 1.021.16 | 0.07/0.05 | 14.06/21.22 |
| B5 | 0.94/0.94 | 0.07/0.05 | 13.02/20.01 |
| Means | 0.00/0.31 | 0.00/0.07 | 999.00/4.41 |

# CHAPTER 4

# DISCUSSION

The literature on youth well-being has indicated LS as a predictor of positive functioning (Suldo, 2016). A variety of antecedents associated with adolescent LS have been identified (i.e., personal characteristics, environmental experiences, and demographic characteristics). Specifically, Evan's (1994) model of LS proposes that personality (e.g., neuroticism and extraversion) and environmental factors (i.e., life stressors, poverty/wealth, polluted/clean air) can influence cognitive appraisals of life circumstance. Extant studies have explored the relationships of such factors with LS across diverse groups of early adolescent youth, however, the appropriateness of such cross-group comparisons with various LS measures has not been universally investigated. Thorough evaluation of the psychometric properties of LS measures is necessary for appropriate interpretation of results in studies comparing findings across diverse groups. Assessment of measurement invariance in such studies is thus becoming more prominent in psychometric assessment. Nevertheless, very few studies to date have examined the psychometric properties of the Brief Measure of Students' Life Satisfaction Scale (BMSLSS; Seligson, Huebner, & Valois, 2003) for cross-cultural, racial, and ethnic comparisons in studies of youth LS. To address this issue, measurement invariance across Black and White early adolescents in the United States was assessed.

First, descriptive statistics, factor loadings, and item-total correlation were analyzed. Factor loadings and item-total correlations indicated that all five items should be included in the study. Next, fit indices of the BMSLSS were examined through use of confirmatory factor analyses (CFA). Results indicated an adequate fit for the theorized one-factor model (Seligson, Huebner, & Valois, 2003) for the Black and White groups.

Measurement invariance across Black and White youth was explored through use of multi-group confirmatory factor analysis (MGCFA). Results supported configural invariance and evidenced a unidimensional model fit across both Black and White groups. Metric invariance was also supported, which indicated equivalent factor loadings and provided support for comparison of factor variances and covariances across groups. Together, these findings provide evidence that Black and White youth in the US conceptualize LS similarly. Results of configural and metric invariance respectively support correlational and regression studies across Black and White early adolescents.

Problems were indicated in the examination of scalar invariance, which were similar to the findings of Zeng and colleagues (2018) in which analysis of measurement invariance of the BMSLSS across samples of Chinese and American youth indicated some concerns with model invariance across groups. Full scalar equivalence is necessary to be able to compare the sum scores or observed means across groups (Steinmetz, 2013). However, if the problematic item can be identified, measures can be altered for future use (Lugtig, Boejie, & Lensvelt-Mulders, 2012). Thus, a test of partial scalar invariance was conducted to determine which of the loadings or intercepts differed across groups.

Non-invariance was identified across groups for the item measuring "satisfaction with self". Scalar non-invariance indicates measurement bias for an item that can be caused by a difference in the loading or intercept of the item, or by true latent variable group difference (Byrne, Shavelson, & Muthén, 1989), which may reflect cultural differences or other between-group differences that impact item responses across groups. This finding is consistent with the literature related to youth self-satisfaction or self-esteem. Greater self-esteem scores have been demonstrated for Black youth compared to White peers in the United States across numerous studies (see Gray-Little & Hafdahl, 2000 for a review; Kanazawa & Li, 2015; Twenge, & Crocker, 2002; Tashakkari & Thompson, 1991; Wade, Thompson, Tashakkori, & Valente, 1989). Furthermore, underlying differences in structure of the construct of self-esteem have been shown in several studies that revealed higher self-esteem scores for Black youth compared to White adolescents, despite reports of lower self-attributions of intelligence by Black adolescents (Martinez & Dukes 1987, 1991).

Greater levels of self-esteem for Black youth may be explained by the social identity theory (Brewer, 1991, 1993; Deaux, 1993; Mullen, 1991), which proposes that Black individuals conceptualize themselves as both distinct from the majority group, but also strongly connected to individuals within their own minority group. Within the Black minority group, individuals positively emphasize their differences from the majority. By both emphasizing distinctions of their group from the majority and creating a positive social identity, Black group members achieve an increased level of collective and individual self-esteem from their social identity. Notably, increased levels of collective and individual self-esteem are not universal across all minority groups as patterns of

social identification may be influenced by cultural differences and distinct histories within the United States (Gray-Little & Hafdahl, 2000).

Due to lack of scalar invariance on one of the items, loadings and intercepts were constrained to be equal across groups for the remaining four items of the partial scalar invariance model and the item for satisfaction with self was estimated freely. Byrne, Shavelson, and Muthén (1989) recommend that valid inferences about differences in latent factor means of a model can be made, given that at least two loadings and intercepts are constrained as equal across groups. Following this step, latent mean differences for both the full (5-item) scalar invariance model and the partial (4-item) scalar invariance model were analyzed to further investigate the appropriateness of group mean comparisons across Black and White groups.

Results indicated similar latent mean differences across groups for both the full (5-item) and partial (4-item) scalar invariance models. Specifically, latent mean analyses across the full and partial scalar invariance models indicated higher LS scores reported by White students. Results of the current study were consistent with findings by Huebner and colleagues (2004), Dew and Huebner (1994), Terry and Huebner (1995), in which moderate differences between groups indicated that White youth reported significantly higher LS scores than Black youth. However, non-significant differences between Black and White youth have also been indicated in the literature (see Gilman & Huebner, 2003 or Huebner, 2004 for a review; Huebner, Drane, & Valois, 2000; Seligson, Huebner, & Valois, 2003; Huebner, Suldo, Valois, & Drane, 2006). Mixed findings may be attributed to sample limitations across studies, confounding effects with other factors, or mediation by additional factors, which should each be considered when interpreting results.

Results of the current study may be illuminated by the bio-social-cognitive model of LS proposed by Evans (1994), which describes the influence of personal characteristics and environmental factors on LS mediated through cognitive appraisals of personal circumstances (see also Lyons et al. 2015). Systemic differences in environmental factors that Black and White youth experience in the United States may help to explain latent mean differences across these groups evident in the current study. Evans's model, in combination with findings in current youth LS literature suggest that differences in LS levels for Black and White youth may be linked to disparities in environmental factors, which show strong effects on youth LS (Headey & Wearing, 1989). More specifically, the daily/chronic stressors that youth face (McCullough, Huebner, & Laughlin, 2000; Ash & Huebner, 2001), such as those potentially perpetuated through discriminatory practices, show stronger effects on LS than major or acute negative events. Latent mean differences in LS scores across Black and White students in the present study evidence the importance of considering the influence of unequal power and privilege experienced by youth based on their minority status and warrant greater examination of the impact of differing experiences that minority youth face.

**Limitations**

The current study is subject to limitations. Although a large sample was used, it should be noted that it was not nationally representative of the U.S. population. As a result, the generalizability of the results obtained in this study should be interpreted with caution. Furthermore, data collected consisted exclusively of self-reported information and future studies might benefit from inclusion of parent and/or teacher report of youth LS levels as well as student interview that address the determinants of their responses.

Additionally, given that the BMSLSS is designed to be used with students from grades three through twelve, future studies should include samples that consist of other age groups including elementary and high school-aged students to evaluate support for measurement invariance of the BMSLSS at different stages of development.

**Implications for Professionals and Future Directions**

The current study adds novel findings to the literature by examining measurement invariance across Black and White early adolescents in the United States. Findings provide preliminary support for use of the BMSLSS with Black and White youth, both individually and in comparative research regarding early adolescent LS. However, latent mean differences between groups indicating higher overall LS levels for White youth indicate the need for future studies that explore factors and outcomes related to cross-group differences. For example, future studies should explore model fit and latent mean differences across diverse groups of Black and White students. Such studies could assess for differences in youth LS scores due to various factors (i.e., geographic location, culture, socioeconomic, individual differences) that could influence evaluations of satisfaction with different domains of LS and overall LS. Future studies should also assess for changes in model fit and latent mean differences across developmental stages. This information could be used to inform appropriate screening and interventions that address youth LS (see Wingate, Suldo, & Peterson, 2018).

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