Emotion Regulation and Sleep among Black and White College Students

by

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Abstract

Emotion regulation has been associated with a range of health outcomes including cardiovascular activation, elevated inflammation, and psychopathy. However, few studies have examined the extent to which specific regulatory strategies may influence sleep, and even fewer have considered the role of race and ethnicity. This is surprising given past research on racial/ethnic differences in the utilization of specific emotion regulation strategies as well as their impact have been studied. In the current study, we investigate differences in emotion regulation strategies and its relations with sleep quality and duration between Black/African American (AA) and White/European American (EA) college students. Participants were 263 undergraduate students from a large university in the Southeastern United States (mean age at baseline = 19.21, *SD* = 1.01; 53% female; 52% Black; 48% White). Sleep quality (waking after sleep onset [WASO], and percent sleep) and sleep duration (sleep minutes) were measured through wrist actigraphy. Expressive suppression, the inhibition of ongoing emotionally expressive behavior, and cognitive reappraisal, the modification of cognitions or behaviors before the onset of an emotional response, were measured with the Emotion Regulation Questionnaire. Black students reported higher reappraisal than White students. The pattern of associations between emotion regulation and sleep varied as a function of race/ethnicity. Expressive suppression was associated with decreases in sleep quality (increases in WASO and decreases in percent sleep) among Black, but not White students. Expressive reappraisal was associated with decreased WASO and increases in sleep percentage for White, but not Black students. No associations were evident for the sleep time measure. This pattern of associations persisted after adjusting for demographic and health behaviors covariates. Results indicate that associations between emotion regulation and sleep and the level of emotion regulation vary as a function of race/ethnicity. The covariates included in

the model did not moderate the associations between emotion regulation and sleep. Future directions should include examining race differences in emotion regulation in multiple contexts across the life span. Additionally, the variables that moderate these associations should be explicated in future research.

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I would like to thank my dog Andie, who is the best big time commitment I have ever made.

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Introduction

Emotion regulation is a process by which individuals influence the expression and experience of affect (Gross, 1998). A large body of work suggests that how we regulate our emotions is associated with a range of outcomes including positive well-being, cardiovascular activation, elevated inflammation, and psychopathy (Appleton et al., 2013; Fernandez et al., 2016; Haga et al., 2009; Roberts et al., 2008b). Fewer, studies, however, have systematically examined the extent to which specific regulatory strategies may influence sleep, and even fewer have considered the role of race and ethnicity. In the current study, we investigate race differences in emotion regulation strategies and their associations with sleep.

Conceptualization of Emotion Regulation

One of the most widely studied models of emotion-regulation focuses on two emotion regulation strategies for dealing with negative situations, namely expressive suppression and cognitive reappraisal (Gross, 1998, 2002). Expressive suppression is a form of response modulation involving the inhibition of ongoing emotionally expressive behavior (Gullone & Taffe, 2012). Cognitive reappraisal involves modifications of cognitions or behaviors before the onset of an emotional response in order to change the emotional impact of an event (Gross, 1998).

Cognitive reappraisal is generally associated with more adaptive psychosocial outcomes including interpersonal functioning, healthier affective patterns, and well-being (Gross & John, 2003; John & Gross, 2004). On the other hand, expressive suppression is often associated with detrimental outcomes (Gross & John, 2003). Individuals who minimize or try to reduce their experience of emotions through expressive suppression have been found to experience reduced

positive affect and life satisfaction, as well as greater negative emotion and a heightened stress response (Egloff et al., 2006; Kashdan et al., 2006; Sperberg & Stabb, 1998).

The role of emotion regulation as a precursor to adaptive sleep is understudied in diverse populations despite the clear significance of this topic for understanding sleep processes and sleep health disparities. Addressing this knowledge gap, the current study examines the role of expressive suppression and cognitive reappraisal as predictors of sleep among Black/African American and White/European American college students.

Emotion Regulation and Sleep

The association between emotion regulation and sleep has been conceptualized as bidirectional such that more adaptive emotion regulation is associated with lower levels of psychosocial stress and more restorative and sufficient sleep; while, in turn, more sufficient and restorative sleep is associated with greater cognitive resources and more adaptive emotion regulation (Gruber & Cassoff, 2014; Kahn et al., 2013). Specifically, in an experimental study of adolescents age 14-17 that manipulated sleep duration, shorter sleep (6.5 hours/night) was associated with poorer emotion regulation than longer sleep (10 hours/night) (Baum et al., 2014). A recent review examined papers detailing the effects of both emotion reappraisal and emotion suppression on sleep with the potential for emotion dysregulation affecting sleep (Palmer & Alfano, 2017). Additionally, in a fMRI study of adolescents and adults ages 18-30, sleep deprivation amplified reactivity of the brain reward network, biasing the appraisal of positive emotional experiences (Gujar et al., 2011). The bidirectional relationship between emotion regulation and sleep is established through multiple reviews including both emotion suppression and reappraisal (Fairholme & Manber, 2015; Gruber & Cassoff, 2014; Vandekerckhove &

Wang, 2017). However, very few if any studies have examined racial/ethnic differences in these associations.

Emotion Regulation and Sleep in the Context of Race/Ethnicity

Studies on emotion regulation to date have included mostly white, middle-class individuals, and leading reviews of emotion regulation research have not discussed the role of race or ethnicity in emotion regulation (Gross, 2013; Palmer & Alfano, 2017). However, a small number of studies have examined race differences in emotion regulation with the majority of these studies focusing on Asian and White samples (Ford & Mauss, 2015; Ma et al., 2018; Matsumoto et al., 2008). These studies demonstrate that Asian American individuals report higher levels of emotion suppression than EAs and their associations with outcomes also vary by race.

Some studies of Black and White participants have found differences by race in the level of emotion suppression and reappraisal as well as their effects on health outcomes. In a study examining the determinants of anger expression and emotion regulation, Black children and adolescents between the ages of 7-18 expressed lower levels of anger and had higher levels of emotion suppression than White individuals (Steele et al., 2003). Additionally, in a longitudinal study of the emotion regulation and behavior problems in Black and White children, emotion regulation strategies of physical comfort seeking and self-soothing were positively associated with Black children's later externalizing behavior but negatively associated with later externalizing behavior for White children (Supplee et al., 2009). These emotion regulation strategies are generally considered positive coping mechanisms and indicate differences in the effects of emotion regulation strategies by race.

These results continue across the life course. In a study examining the role of emotion suppression on elevated blood pressure in Black and White adolescents ages 15-17, Black individuals suppressed their emotions significantly more than their White counterparts (Johnson, 1989). Emotion suppression also explained about 30% more of the variance of blood pressure in Black individuals than White individuals (Johnson, 1989). Additionally, in a series of studies examining the emotion regulation patterns of college students, Latinx, Asian American, and Black participants reported higher levels of emotion suppression than White participants (Gross & John, 2003). However, in a sample of Black, Chinese American, White, and Mexican American college students, the cardiovascular effects of suppressing disgust was not moderated by race (Roberts et al., 2008a) suggesting that the findings may vary when considering suppression of specific emotions rather than general emotion suppression.

Most of these studies including Black individuals focus on emotion suppression rather than emotion reappraisal. However, other racial/ethnic minority groups have been considered. In a sample of Latinx Americans college students in predominantly white contexts, cognitive reappraisal did not reduce depressive symptoms (Perez & Soto, 2011). Additionally, reappraisal reduces the effect of stereotype threat on academic performance (Johns et al., 2008; Richeson & Trawalter, 2005), so Black college students may reappraise at higher levels than White students. These results indicate that in contexts where the saliency of race is increased, such as at predominantly white institutions, reappraisal may be a more frequently used emotion regulation strategy but be less effective for Black college students.

Based on this research, we hypothesize that Black college students will (1) report higher rates of emotion suppression and emotion regulation and (2) that the effects of emotion suppression on sleep will be linked to greater adverse outcomes for Black individuals and

emotion reappraisal will be linked to positive sleep outcomes, but to a lesser extent for Black individuals.

Methods

Design and Participants

Participants are from the College Student Sleep and Health Study, a study examining social determinants of health and health disparities among college students (Fuller-Rowell et al., in prep). The sample includes 263 first and second year undergraduate students (53% female; Mage = 19.21 years, *SD* = 1.01) from a large research university in the southeastern United States. Approximately half of the sample identified as African American/Black (*N* = 137, 58% female) and half as European American/White (*N* = 127, 48% female). As expected in a college sample, the socioeconomic background of participants was above the national average with 59% of participants having at least one parent with a four-year degree, and 40% growing up with a household income of above $120,000.

The study design consists of a laboratory visit, followed by a week-long sleep assessment. Eligible participants were stratified by race, gender, and parent education (i.e. first generation to attend college) and recruited through mailed brochures and follow-up emails. Eligible participants who responded were screened for sleep disorders, or pre-existing conditions that may influence their ability to participate in a three-hour study. Because sleep disorders often go undiagnosed (Kapur & Iber, 2002), and are relatively frequent among college students (Gaultney, 2010), additional screeners for sleep apnea, narcolepsy, restless leg syndrome, and severe insomnia were administered upon arriving at the visit to ensure the sample included no persons with underlying sleep disorders. In total, 21 students screened positive for a sleep disorder (% sleep apnea), and therefore not eligible to participate in the study.

Following the laboratory visit, participants received an Actiwatch-2 activity monitor (Respironics, Inc.) to wear on their non-dominant hand for eight continuous days (seven nights)

and complete corresponding morning and evening diaries to report on their daily experience. Upon completion of their sleep assessment, research assistants reviewed the collected sleep data with the participant to clarify any inconsistencies or perceived abnormalities. All participants had at least one night of actigraphy data, with nearly all (96%) having at least six nights, as per recommendations in previous research (Short et al., 2017).

Measures

Actigraphy. Sleep characteristics were measured using wrist actigraphy and sleep logs. Physical activity counts was collected in 1-minute epoch intervals throughout the eight day period and scored as wake or sleep using Actiware Software (version 9.0) based on a medium threshold of 40 activity counts. Sleep periods were coded by three research assistants using bedtimes and rise times reported on the sleep logs, and reductions and increases in physical activity to identify the most accurate time using both subjective and objective data. Nocturnal and nap periods were coded in separate files so that daily sleep parameters would be calculated independently (i.e. nap duration would not be included in sleep duration with nocturnal sleep). Reliability ratings were very high across the three coders with ICCs ranging from .832 to .991, for both nocturnal and nap intervals.

Sleep Parameters. *Wake after sleep onset (WASO)* was measured as the total number of epochs between the start time and the end time of the given sleep interval scored as wake by Actiware software multiplied by the epoch length in minutes. *Sleep percent* was measured as the percentage of epochs in an interval that are scored as sleep. Scored total sleep time divided by (interval duration minus total invalid time (sleep/wake)) multiplied by 100. *Sleep time* was measured as the total number of epochs for the given interval scored as sleep by Actiware multiplied by the epoch length in minutes. In the current analyses, WASO, sleep percent, and

sleep time parameters were averaged across all nights of available data to compute person-level outcomes. Actigraph-assessed WASO, sleep percent, and sleep time have shown good correspondence in samples using the same device (Curtis et al., 2017) and with polysomnography in community samples (Tryon, 2004).

Emotion Regulation. *The Emotion Regulation Questionnaire (ERQ)* assesses two emotion regulation strategies: cognitive reappraisal, an antecedent focused strategy, and expressive suppression, a response-focused strategy (Sala et al., 2012). Previous research suggests that the ERQ has a high temporal and internal reliability, and convergent and discriminant validity, cross-national validity, and measurement invariance between racial groups (Gross & John, 2003; Melka et al., 2011; Sala et al., 2012). Cognitive reappraisal consisted of six items with high internal consistency across both races in the current sample (Black $\alpha = .870$; White $\alpha = .862$) and expressive suppression consisted of four items, again with adequate internal consistency across both races in the current sample (Black $\alpha = .680$; White $\alpha = .791$)

Health behaviors. The type and amount of substance/medication use was collected each day and aggregated to create person-level scores. *Alcohol* use was coded to reflect the US Departments of Health and Human Services (DHHS) and Agricultures (USDA) 2015-2020 dietary guide, with moderate use defined as one drink per day for women, and up to two drinks per day for men (DeSalvo et al., 2016). Heavy alcohol use was defined as two to three drinks per day for women, and three to four drinks for men. Finally, very heavy alcohol use was defined as three or more drinks per day for women, and four or more drinks for men. *Nicotine* consumption was defined as no use (0), any e-cigarette use (1), and any tobacco use (2). *Sleep medication* responses were dichotomously coded (No = 0, Yes = 1), and averaged across the seven days for each participant. *Caffeine* type and amount was first converted in total milligrams of caffeine. For

consistency, all "coffee" entries were coded to reflect 92 milligrams for every 8 ounces and all "tea" entries were coded to reflect 26 milligrams for every 8 ounces (USDA, 2019). The amount of caffeine in soda or energy drinks was converted by referencing the respective brands nutrition information. Caffeine consumption was then coded to reflect no use (0; 0mg), light (1; 1mg-57mg), moderate (2; 58mg- 105mg), heavy (3; 106mg-183mg) and very heavy use (4; 184mg-1500mg).

Analyses and Missing Data

Multi-group regression analyses were conducted in Mplus (Version 8.0) using the maximum likelihood estimator. Independent samples t-tests and chi-square difference tests were used to test for differences on continuous variables between groups. A series of linear regression models were fit to examine emotion suppression and emotion reappraisal as predictors of each sleep outcome. Emotion regulation measures were standardized in all analyses and models were estimated to attain both standardized and unstandardized estimates. Models with standardized outcome variables are reported in the Tables. Unstandardized estimates are reported in the text so that results can also be interpreted in original units for WASO and sleep percent. Model 1 included either emotion reappraisal or emotion suppression and adjusted for sex, age, and race. Model 2 added an interaction effect between race and emotion suppression or emotion reappraisal. Model 3 added caffeine, alcohol, nicotine, and sleep medication as additional health behavior controls. Each of these measures has been used in sleep studies to help control for differences in sleep quality based on health behaviors (Clark & Landolt, 2017; Li et al., 2020; Slopen et al., 2016). Missing data were dealt with using full-information maximum likelihood estimation. Of the 263 individuals included analyses, 8% (5% White; 13% Black) had missing data on sleep actigraphy parameters. All other variables had less than 2% missingness. To further

probe this assumption, additional analyses were conducted to examine whether the reported results differed when including only those who had no missing data. The general pattern of findings and significance was equivalent to those reported in primary analyses. Specifically, the association between emotion regulation and sleep remained statistically significant and was similar in magnitude.

Results

Table 1 provides descriptive statistics and correlations for key variables in the full sample. WASO, sleep percent, and sleep time were all within normal ranges for healthy adolescent samples (Short et al., 2012). Several variables were skewed. Age was positively skewed 1.45 (SE = .15), WASO was positively skewed .88 (SE = .16), sleep percent was negatively skewed -1.54 (SE = .16), and sleep time was negatively skewed -.83 (SE = .16). All other variables were determined to be normally distributed. However, larger samples that have a violation of normality can still produce accurate *p*-values, therefore a non-parametric test was not run to correct for normality (Ghasemi & Zahediasl, 2012).

Race Differences in Means

Differences between Black and White participants on mean levels of study variables are shown in Table 2. Black individuals (M = 5.31, SD = .99) as compared to White individuals (M = 4.94, SD = 1.01) reported significantly higher emotion reappraisal (d = .37, $t(258)$ = 1.7, p = .004). Additionally, Black individuals (M = 4.17, SD = 1.17) as compared to White individuals (M = 3.94, SD = 1.22) reported higher emotion suppression but this difference was not significant (d = .19, $t(258)$ = -1.58, p = .115). Black students had significantly lower sleep percent (d = .32, p = .014), less sleep time (d = .67, p <.001), and less caffeine (d = 1.03, p <.001), alcohol (d = .48, p <.001), and nicotine use (d = .33, p = .010).

Emotion Regulation and Sleep

Models examining the association between emotion suppression and WASO are shown in Table 3. Model 1 parameter estimates indicated that neither race (p = .369) nor emotion suppression (p = .108) were significantly associated with WASO. Model 2 also showed that the interaction between emotion suppression and race was not significant (p = .119). However,

analysis of the simple slopes revealed a significant association between emotion suppression and WASO among Black students (p = .010), but not EAs (p = .904). The magnitude of the association for Black students suggested that each *SD* unit increase in emotion suppression was associated with a corresponding increase of .211 *SD* units (equivalent to 4.45 minutes) in WASO. When health behavior covariates were added in Model 3, this association for Black students remained similar and even increased slightly in magnitude (B = .215, p = .009).

Models examining the association between emotion reappraisal and WASO are shown in Table 4. Model 1 parameter estimates indicated that race was trending towards significance (B = .101, p = .093) and emotion reappraisal was significantly associated with WASO (B = -.186, p = .003). The magnitude of the association suggested that each *SD* unit increase in emotion suppression was associated with a corresponding decrease of .186 *SD* units (equivalent to 3.93 minutes) in WASO. Model 2 showed that the interaction between emotion suppression and race was not significant (p = .234). However, analysis of the simple slopes revealed a significant association between emotion reappraisal and WASO among EAs (p = .003), but not Black students (p = .220). The magnitude of the association for EAs suggested that each *SD* unit increase in emotion reappraisal was associated with a corresponding decrease of .262 *SD* units (equivalent to 5.52 minutes) in WASO. When health behavior covariates were added in Model 3, this association for EAs remained similar and even increased slightly in magnitude (B = -.266, p = .002).

Models examining the association between emotion suppression and sleep percent are shown in Table 5. Model 1 parameter estimates indicated that emotion suppression (B = -.111, p = .056) was trending towards being significantly associated with WASO and race was significantly associated with WASO (-.155 *SD* units, p = .008). The magnitude of the association

suggested that each *SD* unit increase in emotion suppression was associated with a corresponding decrease of .111 *SD* units (equivalent to .548 percentage points) in sleep percent. Model 2 also showed that the interaction between emotion suppression and race was not significant (p = .104). However, analysis of the simple slopes revealed a significant association between emotion suppression and sleep percent among Black students (p = .013), but not EAs (p = .795). The magnitude of the association for Black students suggested that each *SD* unit increase in emotion suppression was associated with a corresponding decrease of .211 *SD* units (equivalent to 1.52 percentage points) in sleep percent. When health behavior covariates were added in Model 3, this association for Black students remained similar and even increased slightly in magnitude (B = -.216, p = .011).

Models examining the association between emotion reappraisal and sleep percent are shown in Table 6. Model 1 parameter estimates indicated that both race (B = -.195 *SD* units, p = .001) and emotion suppression (B = .146, p = .014) were significantly associated with sleep percent. The magnitude of the association suggested that each *SD* unit increase in emotion reappraisal was associated with a corresponding increase of .146 *SD* units (equivalent to .722 percentage points) in sleep percent. Model 2 also showed that the interaction between emotion suppression and race was not significant (p = .320). However, analysis of the simple slopes revealed a significant association between emotion suppression and WASO among EAs (p = .004), but not Black students (p = .395). The magnitude of the association for White students suggested that each *SD* unit increase in emotion suppression was associated with a corresponding increase of .208 *SD* units (equivalent to 1.03 percentage points) in sleep percent. When health behavior covariates were added in Model 3, this association for White students remained similar and even increased slightly in magnitude (B = .211, p = .004).

Discussion

The current study investigated racial differences in emotion reappraisal and emotion suppression strategies and their association with sleep. Results from the current study suggest that expressive suppression was associated with more disturbed sleep (increased WASO and decreased sleep percent) for AA but not EA students. On the other hand, emotion reappraisal was associated with less disturbed sleep (decreased WASO and increased sleep percent) for EA but not AA students. However, although the pattern of statistically significant associations was different for AA and EA students, race was not a significant moderator of the association between emotion regulation and sleep, suggesting that with respect to race differences, the results of this paper should be interpreted with caution. Findings also showed that AA students reported higher levels of both emotion reappraisal and expressive suppression than EA students. These findings partially confirm the study's hypotheses, showing that AA students reported higher general emotion regulation.

Results from the current study is consistent with previous research, showing that expressive suppression is associated with negative health outcomes and emotion reappraisal is associated with positive health outcomes (Haga et al., 2009). These results extend this work by showing disparate findings by racial group. To the best of our knowledge, no other studies have examined the effect of emotion regulation on objective indicators of sleep and the role of race/ethnicity.

These differences may reflect the societal stratification in power and resources in the US based on race and experiences of discrimination and bias related to power structures (Coates, 2008; Steele et al., 2003). While Black individuals may be forced into social positions in which they experience high levels of anger, anxiety, and hostility as a result of feeling evaluated and

threatened by the dominant White culture, these feelings are likely to be suppressed because of the fear of negative reactions or confirming existing biases (Johnson, 1989; Steele et al., 2003). Therefore, regardless of experienced emotions, differences in emotion expression or lack of expression may reflect the effects of racial discrimination (Steele et al., 2003; Walley-Jean, 2009).

In support of this perspective, when Black individuals interacted with White individuals in a lab, they exhibited lower emotion expression and greater physiological reactivity than when they interacted with Black individuals (Vrana & Rollock, 2002). Thus, Black individuals regulated the expression of emotions around White individuals, even though it was internally inconsistent with their emotions. Another study of subjective, behavioral, and physiological emotional arousal produced similar findings, with Black young adults showing greater emotional behavior response to racially matched film clips as compared to racially mismatched clips (Roberts & Levenson, 2006). Even in film clips, Black individuals suppressed emotion more when interacting with White individuals. These findings are especially relevant at a predominantly white institution.

These differences may start at early ages because of differential parenting strategies in emotion socialization that also reflect the discrepant environments and experiences children face based on their race. This perspective is consistent with research showing that Black children experience racism from a very early age and emotion socialization is an important way that Black parents prepare their children to deal with these experiences (Dunbar et al., 2017; Sanders-Phillips, 2009). The current literature shows a complex interaction of both supportive and unsupportive responses to children's emotion expression. Black mothers responded significantly more negatively to their children displaying negative emotions than did White mothers (Nelson

et al., 2012). Additionally, supportive parental responses to children's emotion expression were negatively associated with children's social and academic competence in Black children and positively associated with children's social and academic competence in White children (Nelson et al., 2013). However, other studies have shown that Black parents value and talk about the open expression of both positive and negative emotion (Boykin & Toms, 1985; Garrett-Peters et al., 2011; Parker et al., 2012). Thus, a complex interaction of both supportive and unsupportive reactions to emotions are pieced together to provide Black children with ways to regulate their emotions that are protective in the multiple contexts that they encounter (Dunbar et al., 2017).

This aligns with literature showing that there isn't only one emotion regulation strategy that is helpful, but a combination of several emotion regulation strategies is the best approach (Aldao & Nolen-Hoeksema, 2012; Westphal et al., 2010). Future research should incorporate this perspective into studies on emotion regulation, examining differences in the level and effects of emotion regulation by race/ethnicity, age, socioeconomic status, and familial emotion regulation socialization. Additionally, the combination of several regulation strategies should be examined rather than studies examining expressive suppression and cognitive reappraisal exclusively.

Some limitations of the current study should be noted. First, recent work suggests that rather than specific strategies a combination of strategies may be most beneficial (Aldao & Nolen-Hoeksema, 2012; Westphal et al., 2010). Future research should incorporate this perspective into studies on emotion regulation, examining differences in the level, variability and effects of emotion regulation by race/ethnicity. Importantly, the current study is cross-sectional and thus cannot infer causality. Longitudinal studies or lab manipulations would help to ascertain the order of effects, and examine the bidirectional effects of sleep and emotion regulation. Last, the study included a middle to upper-middle income sample of Black and White college students

from a large university in the southeastern area of the United States. Individuals who attend college are a specific subset of the population who were academically and financially able to enroll, limiting the generalizability of the study. This study may not be capturing the full nuanced view of these differing effects on emotion regulation and may not generalize to other populations or locations. More work is needed to examine mechanisms for group differences in emotion regulation and its consequences in diverse populations.

However, this sample is also a notable strength as generally, studies on emotion regulation that include Black individuals focus on low-income, urban samples (Cunningham et al., 2009; Sun et al., 2020). The Black students who are enrolled in college may also have differing emotion regulation strategies than those who are not. Emotion regulation, and reappraisal specifically, has been shown to moderate associations between stereotype threat and executive resource depletion (Johns et al., 2008; Richeson & Trawalter, 2005). Executive resources are necessary to effectively complete academic tasks and this may indicate that those who are able to reappraise their emotions and decrease the effects of stereotype threat on executive resources are more likely to attend college. Additionally, among Black adolescents, the relationship between neighborhood violence exposure and academic achievement is moderated by emotion regulation (King & Mrug, 2018). Thus, emotion regulation skills may be a construct that predicts the students who attend and stay at college and this sample may only include those who were able to emotionally regulate at higher levels or experienced less events that required emotion regulation. This is a strength of the study as well, as emotion regulation among Black college students may encourage resiliency and positive coping strategies in students while dealing with multiple stressors. Future research should examine emotion regulation as a predictor of college attendance and success among diverse samples.

Results of this study indicate that, in a college student sample, emotion regulation is differentially associated with sleep among Black and White college students, persisting even after controlling for health behaviors. While this moderation was not significant, this research builds upon previous research showing that emotion regulation levels and outcomes differ by race and adds to this literature by examining these differences in a college sample using an objective outcome. The current study discusses several reasons that may be causing these differential uses and outcomes associated with emotion regulation and potential topics for future studies. The findings suggest that further research examining the moderating role of race in the associations between emotion regulation and sleep is warranted.

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Tables

Table 1.

Descriptive Statistics and Zero-order Correlations for Study Variables.

	1	2	3	4	5	6	7	8	9	10	11	12
1. Age	-											
2. Sex (Female)	-.178**	-										
3. Race (Black)	.055	.100	-									
4. Expressive Suppression	.058	-.165**	.098	-								
5. Expressive Reappraisal	.095	.061	.179**	.196**	-							
6. WASO	.154*	-.142*	.068	.137*	-.164*	-						
7. Sleep Percent	-.121	.211**	-.158*	-.165*	.118	-.776***	-					
8. Sleep Time	-0.104	0.141*	-0.318***	-0.006	-0.086	0.109	0.382***	-				
9. Caffeine	0.052	-0.003	-0.465***	-0.045	-0.055	0.022	0.074	0.135*	-			
10. Alcohol	0.29	-0.087	-0.237	-0.064	-0.074	0.063	-0.087	-0.031	0.081	-		
11. Nicotine	-0.014	-0.185**	-0.164**	-0.030	-0.038	0.099	-0.105	0.029	0.113	0.406***	-	
12. Sleep Medication	-0.034	-0.084	-0.101	-0.012	-0.024	0.044	0.002	0.145*	0.129*	0.183**	0.104	-
Mean (%)	19.21	(54%)	(52%)	4.06	5.13	58.35	86.61	380.3	0.70	0.21	0.09	0.03
SD	1.01			1.20	1.01	21.11	4.95	54.08	0.92	0.38	0.27	0.12

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

Table 2.
Race differences in study variables.

	White	Black	p-value
Age	19.15 (0.95)	19.26 (1.06)	.370
Sex (Female)	48%	58%	.106
Suppression	3.94 (1.22)	4.17 (1.17)	.115
Reappraisal	4.94 (1.01)	5.31 (0.99)	.004
WASO	56.91 (20.87)	59.76 (21.34)	.294
Sleep Percent	87.39 (4.47)	85.83 (5.28)	.014
Sleep Time	397.51 (41.09)	363.15 (59.85)	<.001
Caffeine	1.14 (1.04)	0.29 (0.53)	<.001
Alcohol	0.31 (0.44)	0.13 (0.30)	<.001
Nicotine	0.14 (0.33)	0.05 (0.18)	.010
Sleep Medication	0.04 (0.14)	0.02 (0.10)	.109

Table 3.

Results of Multiple Regression Models Examining Predictors of WASO.

	Model 1		Model 2		Model 3	
	B	*SE*	*B*	*SE*	*B*	*SE*
Intercept	2.822***	0.176	2.803***	0.18	2.690***	0.217
Age	0.126^{+}	0.064	0.124^{+}	0.064	0.132*	0.064
Sex (Female)	-0.108^{+}	0.065	-0.1	0.066	-0.078	0.067
Black	0.055	0.061	0.053	0.06	0.079	0.064
Suppression	0.106	0.066	0.012	0.099	0.011	0.101
Suppression*Black			0.141	0.09	0.144	0.092
Caffeine					0.008	0.072
Alcohol					0.023	0.064
Nicotine					0.100	0.064
Sleep Medication					0.033	0.04

Note. $^{+} < .10$ *$p < .05$, **$p < .01$, ***$p < .001$. Outcome variable is standardized. Age and suppression are also z-scored.

Table 4.

Results of Multiple Regression Models Examining Predictors of WASO.

	Model 1		Model 2		Model 3	
	B	*SE*	*B*	*SE*	*B*	*SE*
Intercept	2.779***	0.179	2.756***	0.182	2.667***	0.217
Age	0.148*	0.062	0.149*	0.061	0.157*	0.062
Sex (Female)	-0.115^{+}	0.064	-0.106	0.066	-0.084	0.068
Black	0.101^{+}	0.06	0.102	0.06	0.117^{+}	0.064
Reappraisal	-0.186**	0.063	-0.262**	0.087	-0.266**	0.087
Reappraisal*Black			0.108	0.09	0.123	0.091
Caffeine					-0.01	0.065
Alcohol					0.024	0.064
Nicotine					0.093	0.068
Sleep Medication					0.034	0.04

Note. *$p < .05$, **$p < .01$, ***$p < .001$. Outcome variable is standardized. Age and reappraisal are also z-scored.

Table 5.

Results of Multiple Regression Models Examining Predictors of Sleep Percent.

	Model 1		Model 2		Model 3	
	B	*SE*	*B*	*SE*	*B*	*SE*
Intercept	17.523***	1.463	17.537***	1.462	17.669***	1.452
Age	-0.071	0.075	-0.07	0.074	-0.072	0.074
Sex (Female)	0.192**	0.059	0.185**	0.06	0.168**	0.062
Black	-0.155**	0.058	-0.154**	0.058	-0.19**	0.057
Suppression	-0.111^{+}	0.058	-0.021	0.08	-0.02^{+}	0.08
Suppression*Black			-0.135	0.083	-0.139	0.082
Caffeine					-0.019	0.067
Alcohol					-0.081	0.068
Nicotine					-0.084	0.077
Sleep Medication					0.022	0.048

Note. *$p < .05$, **$p < .01$, ***$p < .001$. Outcome variable is standardized. Age and suppression are also z-scored.

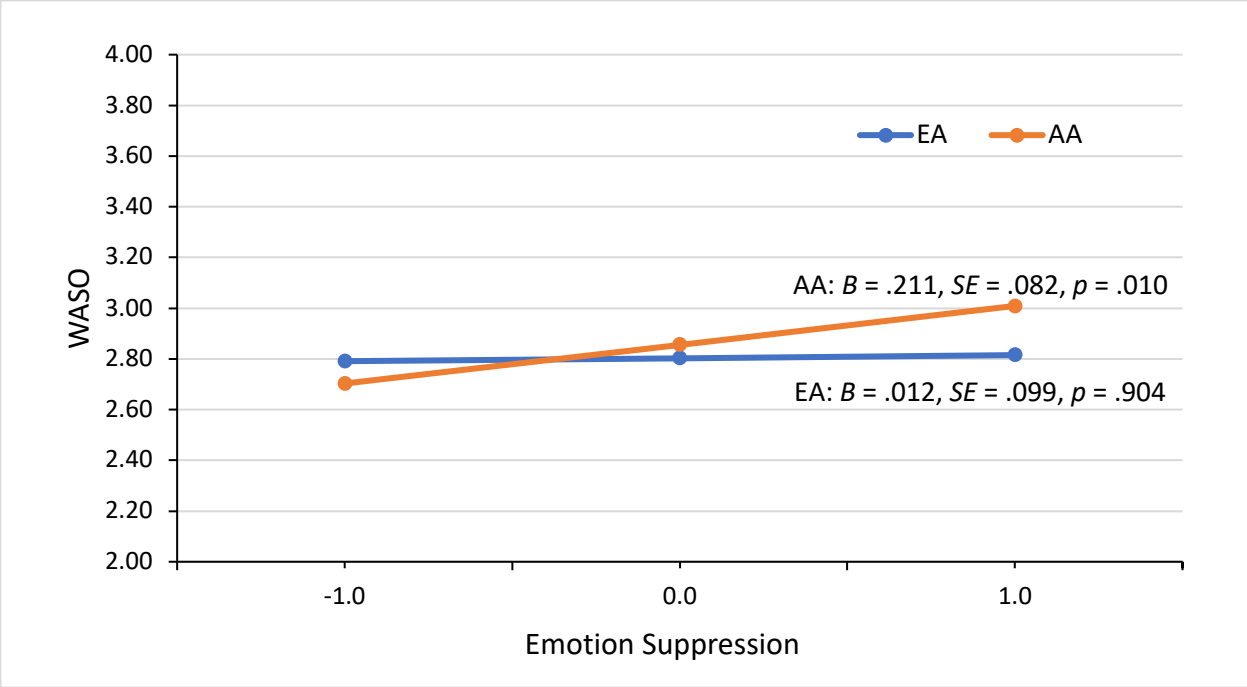
Table 6.

Results of Multiple Regression Models Examining Predictors of Sleep Percent.

	Model 1		Model 2		Model 3	
	B	*SE*	*B*	*SE*	*B*	*SE*
Intercept	17.547***	1.464	17.571***	1.469	17.687***	1.462
Age	-0.09	0.078	-0.091	0.077	-0.093	0.077
Sex (Female)	0.204**	0.059	0.196**	0.06	0.18**	0.064
Black	-0.195**	0.058	-0.195**	0.057	-0.224***	0.056
Reappraisal	0.146*	0.06	0.208**	0.071	0.211**	0.073
Reappraisal*Black			-0.089	0.089	-0.102	0.091
Caffeine					-0.006	0.064
Alcohol					-0.082	0.067
Nicotine					-0.076	0.079
Sleep Medication					0.019	0.047

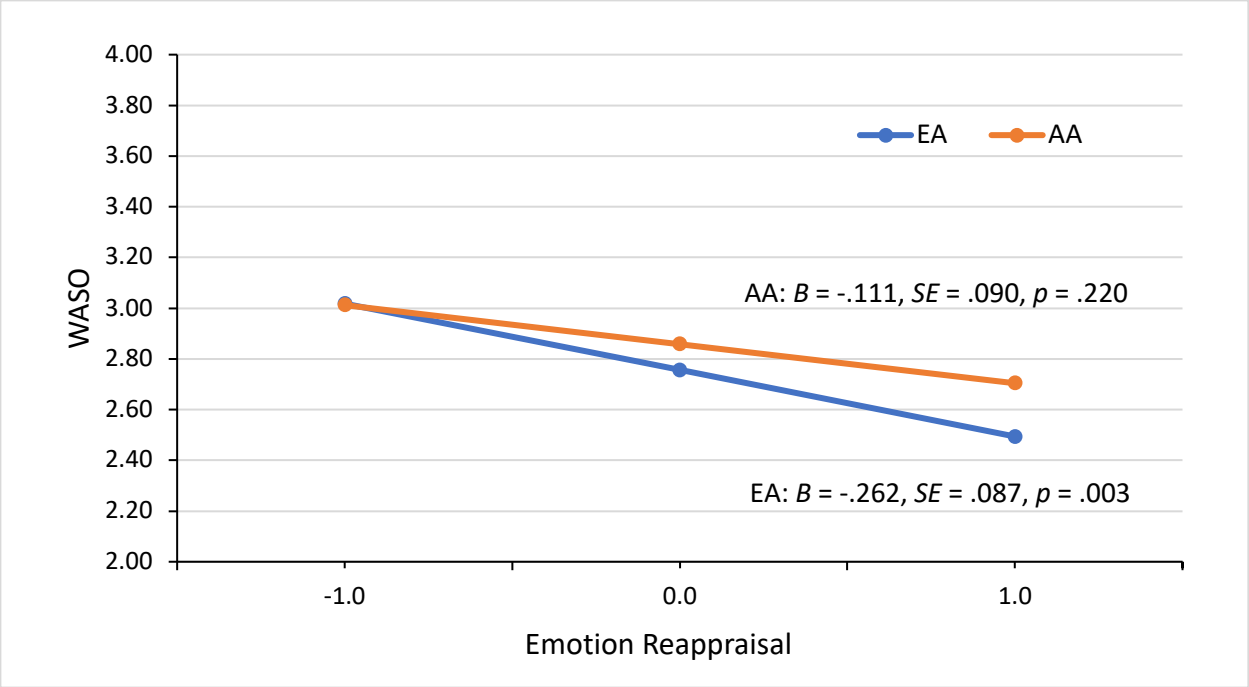
Note. *$p < .05$, **$p < .01$, ***$p < .001$. Outcome variable is standardized. Age and reappraisal are also z-scored.

Figure 1. Interaction Plot for WASO and Emotion Suppression



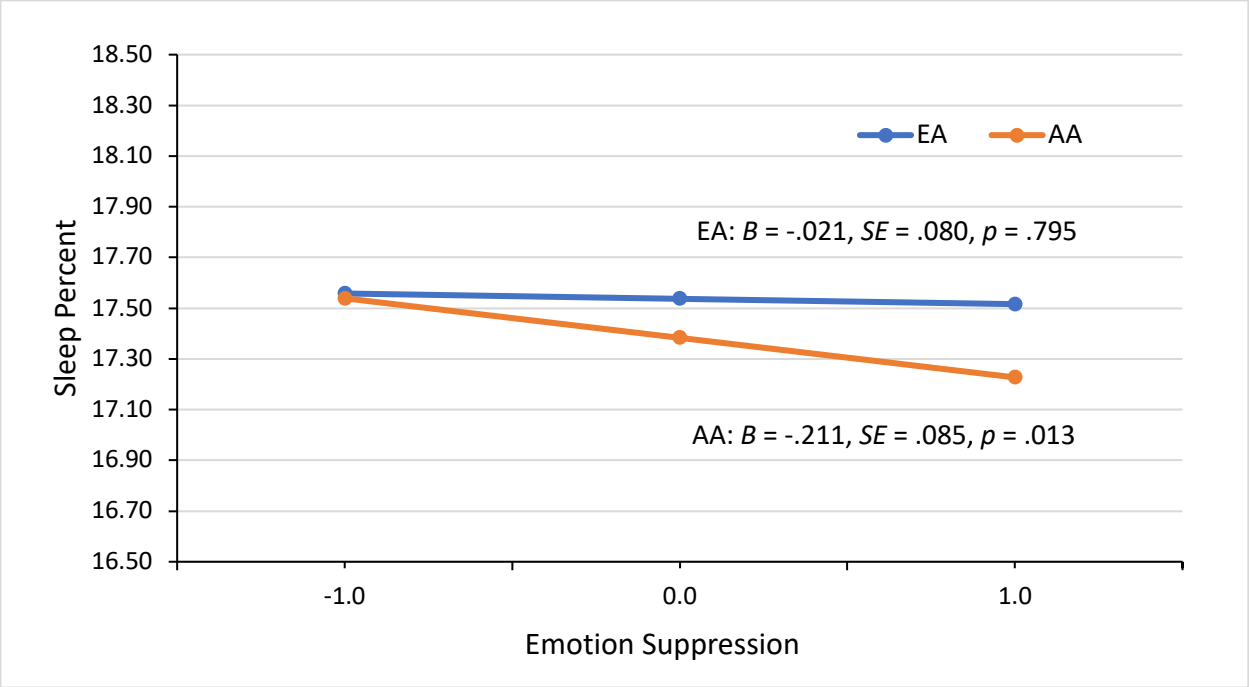
Note. These results correspond with Model 2 in Table 3.

Figure 2. Interaction Plot for WASO and Emotion Reappraisal



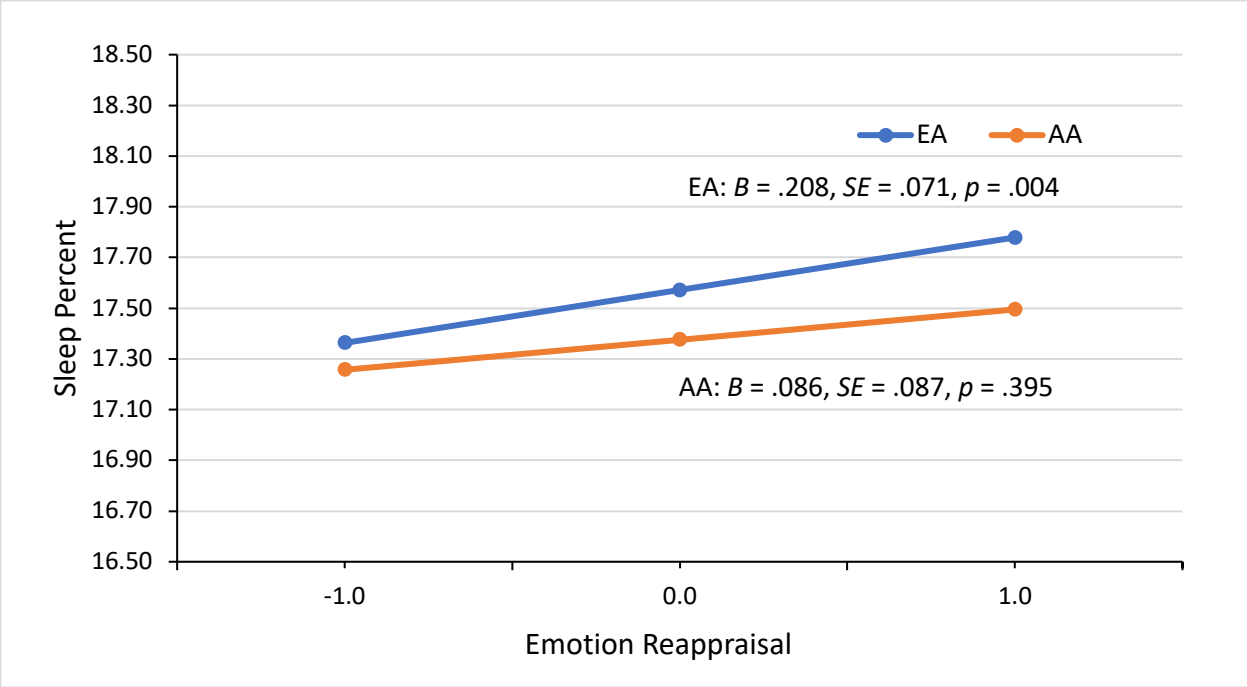
Note. These results correspond with Model 2 in Table 4.

Figure 3. Interaction Plot for Sleep Percent and Emotion Suppression



Note. These results correspond with Model 2 in Table 5.

Figure 4. Interaction Plot for Sleep Percent and Emotion Reappraisal



Note. These results correspond with Model 2 in Table 6.