Research Paper

Examining disordered eating and depressive symptomatology in adults with Sickle Cell Disease (SCD): Gender differences

Deja Buckner [a,c,d], Bridgette Pittman Blackwell [a,b,c,d], John J. Sollers III [a,b,c,d],
W. Jeff Bryson [d,f], Alexandria McDougald [a,c,d], Mary Wood [d], Camela S. Barker [d,f,g],
Jessica Miller [d,h], Elaine Whitworth [d,h], Erika N. Cubilete [c,d], Jenny Norris [a,b,c,d],
Danielle May [a,b,c,d], Meredyth Galliher [a,b,c,d], Beyonnshea N. Lucas [a,c,d], Cara Green [a,c,d],
Erika Cubilete [a,c,d], Ben Bayan [a,b,c,d], Ashley Lopez [a,c,d], John J. Sollers IV [b,c,d,l],
Malik Muhammad [a,b,c,d], Asha Lockett [a,c,d], Jasmine Benner [a,c,d], Noa Wax [a,b,c,d],
Samantha Beavers [a,c,d], Wandy Cubilete [d,e], Suquey Castillo-Lopez [a,b,c,d],
Jeneishka Torres Rivera [a,c,d], Camryn Cutchin [a,c,d],
Goldie Byrd [d,i], Dwayne Brandon [a,d], Stephanie Johnson [m],
Joseph L. Kennedy [a,c,d], Sherry Eaton [a,b,c,d], Brianna Downey [m], Jonathan Livingston [a,b,c,d],
Debra O. Parker [a,c,d], Raymona Lawrence [n], Shiv Sudhakar [d,j], Richard Boorst-Marx [d,e],
Elwood Robinson [d,k], Ify Osunkwo [o], Christopher L. Edwards [a,b,c,d,h,n,*] (iD)

[a] North Carolina Central University, United States
[b] Sollers Psychophysiology & Health Laboratory, United States
[c] Debra O. Parker Research Incubator, United States
[d] Psychoneuroendocrine and Rare Diseases Laboratory, North Carolina Central University, TEB 315, Durham, NC 27707, United States
[e] Duke University Medical Center, United States
[f] Fielding Graduate University, United States
[g] Rochester Institute of Technology, United States
[h] Bridges Point Sickle Cell Foundation, United States
[i] Wake Forest Medical Center, United States
[j] California Northstate University, United States
[k] Winston-Salem State University, United States
[l] Thomas More University, United States
[m] Private Practice, United States
[n] Community Health in the Jiann Ping Hsu College of Public Health, Georgia Southern University, United States
[o] Novo Nordisk, United States

ARTICLE INFO

ABSTRACT

Sickle cell disease (SCD) is a genetic disorder characterized by distorted red blood cells that possess a decreased ability to carry oxygen and carbon dioxide throughout the body, primarily impacting individuals of African, Mediterranean, and South American backgrounds. The present study sought to examine the relationship between disordered eating patterns and depressive symptomatology by comparing self-identified gender differences in patients with SCD. Disordered eating was measured using the Eating Disorder Inventory (EDI-I), which encompasses four subscales including body dissatisfaction (BD), ineffectiveness (IE), interpersonal distress (ID), and interoceptive awareness (IA). Depressive symptoms were assessed using the Beck Depression Inventory-I (BDI-I) and the Center for Epidemiological Studies-Depression (CES-D). In a sample of 37 Black adults with SCD (30 female and 7 male), the results showed that women exhibited higher body dissatisfaction and depressive symptoms in comparison to men ($p < .05$). Women with SCD simultaneously experiencing high incidences of

---

* Corresponding author at: Psychoneuroendocrine and Rare Diseases Laboratory, North Carolina Central University, TEB 315, Durham, NC 27707, United States.
E-mail address: cedwards@nccu.edu (C.L. Edwards).

body dissatisfaction and depressive symptoms could impact their prognosis, psychological functioning, and overall health. Further research is needed to examine this issue and its implications.

Introduction

Sickle cell disease (SCD) is a rare blood disorder that primarily impacts individuals of African, Mediterranean, and South American descent. SCD is characterized by red blood cells that are distorted into a crescent shape, instead of the usual circular shape of red blood cells in healthy individuals (Brandow et al., 2014). This change in shape predisposes sickled red blood cells to a shortened circulatory life span reducing the number of red blood cells in the body, which is known as anemia. Due to the decreased number of healthy red blood cells, patients with SCD suffer from chronic anemia, organ damage, vaso-occlusive pain crisis, and premature death in many cases (Brandow et al., 2014). Anemia causes the individual to experience fatigue, shortness of breath, and other uncomfortable symptoms (Manwani & Frenette, 2013). SCD is characterized by a plethora of other medical complications: repeated infections, leg ulcers, acute chest syndrome, gallstones, pulmonary hypertension, priapism, delayed pubertal development and pregnancy complications in women (Brandow et al., 2014; Raji et al., 2016). In addition to physical complications, 65% of people with SCD experience depressive symptoms due to the severity of the disease (Gibson et al., 2013). The combination of experiencing depression and suffering from a chronic illness is associated with poor medical outcomes and overall decreases one's quality of life (Birk et al., 2019).

It is important to acknowledge the gender differences that may be present in patients with SCD. Males and females with SCD typically experience delayed pubertal development which creates isolation and psychological distress compared their peers. Women with SCD are more likely to experience painful menstrual cycles and more severe pregnancy symptoms with higher risks of adverse pregnancy outcomes. Similarly, males with SCD may experience priapism, a prolonged painful penile erection due to the sequestration of sickled red cells within the penile corpus cavernosum tissues that leads to erectile dysfunction. (Addis et al., 2007).

Due to the severity of disease, patients with SCD are likely to experience depression which may impact on their eating habits. Patients with SCD who develop disordered eating patterns while managing the severe complications of SCD are at a significantly higher risk for adverse health outcomes—both medically and psychologically. Depression and other psychological disorders have been found to be correlated with many chronic illnesses (Simon et al., 2005). Those who suffer from SCD endure ongoing chronic pain and serious health complications that may influence the presence and severity of depression (Reddy et al., 2011). Pain crises and other medical complications that are common occurrences in SCD have the potential to change the way patients nourish their bodies. Those who struggle with eating disorders tend to battle depression which may impact one's eating habits. While the relationship between eating disorders and depression has been examined in other clinical populations, there is a significant gap in the literature that examines the relationship between disordered eating patterns and depression in adults with SCD.

The relationship between disordered eating patterns and depression in patients with SCD remains unknown and understudied. There is also limited insight in the literature about the course of eating disorder patterns and depression in SCD populations. This study therefore focuses on the factors that may be responsible for the development of disordered eating patterns and how it may influence depressive behaviors observed in patients with SCD. Additionally, SCD affects individuals of African descent, our sample consisted exclusively of Black adults with SCD, reflecting the prevalence of SCD in this population. In the present study, we aimed to examine the relationship between disordered eating patterns and depressive symptomatology in a sample of Black adults with

SCD, using validated self-report measures. Specifically, we investigated how scores on four subscales of the Eating Disorder Inventory-1, Body Dissatisfaction, Ineffectiveness, Interpersonal Distrust, and Interoceptive Awareness, were associated with depressive symptoms as measured by the Beck Depression Inventory and the Center for Epidemiological Studies Depression Scale. These EDI-I subscales were selected based on prior research linking them to both disordered eating behaviors and symptoms of depression. Additionally, we explored whether these associations differed by gender.

Method

Participants

As part of a larger study on sickle cell disease conducted at Duke University prior to COVID-19, African American adults with SCD completed several questionnaires and scales to measure their physiological and psychological health. Some scales included the Eating Disorder Inventory-I (EDI-I), the Beck Depression Inventory (BDI-I), and the Center for Epidemiological Studies-Depression (CES-D). In this study, thirty-seven participants (30 women, 7 men) completed all three of these inventories, and their data was analyzed. Informed consent was obtained prior to participation in the study. Exclusionary criteria included a standing diagnosis of any medical condition other than SCD, an eating disorder diagnosis, individuals under the age of 18, and the inability to read or write.

Materials

Eating Disorder Inventory-I (EDI-I)

The Eating Disorder Inventory-I (EDI-I) is a self-report questionnaire consisting of 64 items designed to assess cognitive and behavioral characteristics commonly associated with eating disorders, particularly anorexia nervosa and bulimia nervosa (Garner et al., 1983). The instrument includes multiple subscales that evaluate domains such as drive for thinness, body dissatisfaction, and perfectionism. Participants respond using a six-point Likert scale. The EDI-I has demonstrated good internal consistency and validity in clinical and non-clinical populations and is widely used in research examining the psychological correlates of disordered eating.

The EDI-I subscales of Body Dissatisfaction, Ineffectiveness, Interpersonal Distrust, and Interoceptive Awareness were selected for analysis because they are closely related to both disordered eating behaviors and symptoms of depression. Body Dissatisfaction reflects negative feelings about one's body, which are common in eating disorders and linked to depressive mood. Ineffectiveness captures low self-worth and feelings of inadequacy, which are shared features of both depression and disordered eating. Interpersonal Distrust measures difficulties in trusting and connecting with others, which can lead to emotional distress and unhealthy coping strategies. Interoceptive Awareness reflects how well individuals can recognize and respond to their internal emotional and physical states; problems in this area are associated with both depression and disordered eating. These subscales were used to help explore how disordered eating and depression may be connected in people with SCD, and whether these experiences differ by gender.

Beck Depression Inventory-I (BDI-I)

The Beck Depression Inventory-I (BDI-I) is a 21-item self-report questionnaire widely used for measuring severity of depression. It is clinically appropriate for individuals aged 13 and older. It is composed of items relating to depression such as hopelessness, irritability, guilt,

appetite, sleep, and feeling punished. It also captures physical symptoms of depression such as weight loss, fatigue, and sex drive (Thombs et al, 2010). The BDI-I contains four categories by which the severity of depressive symptoms can fall into: minimal (0-13), mild (14-19), moderate (20-28), and severe (29-63). Response options were evaluated on a scale value ranging from 0-3 for each question, where 0 indicates little to no presence and 3 indicates very high presence of a particular symptom (Storch et al, 2004). The BDI-I has high reliability and internal consistency compared to other assessments that capture depression, such as the Hamilton Depression Rating Scale; when correlated with this scale, it yielded a Pearson's $r = .70$ (Toledano & Contreras-Valdez, 2018). Therefore, this scale was appropriate for this study given its high validity and reliability, and clinical utility to identify depressive symptoms.

Center for Epidemiological Studies of Depression (CES-D)

The Center for Epidemiological Studies-Depression scale is a 21-item self-report measure that screens depressive symptoms in caregivers by asking caregivers to rate how often they experienced depression over the past week. This measure includes symptoms of depression such as loneliness, restless sleep, and poor appetite. The response options range from 0-3, with 0 = never or not at all, 1 = some or little of the time, 2 = moderately or much of the time, and 3 = most or all the time. The CES-D is an exceptionally reliable measure that is sensitive between caregivers and non-caregivers.

Procedure

At the beginning of the study, participants were briefed on the purpose of the study and given a verbal explanation of the informed consent and compensation processes. It was explained that participation was completely voluntary, and participants could withdraw from the study at any time. Participants were supplied with all utensils necessary to facilitate engagement. They were allowed access to personal items needed to complete the questionnaires, including glasses and hearing aids. The first questionnaire provided was the EDI-I. Next, participants were provided with the BDI-I and the CES-D. After the completion of the scales, all self-report measures were scored and analyzed.

Statistical analysis

To examine the relationship between gender and disordered eating habits among individuals with SCD, Spearman's Rho correlations were used. This non-parametric test was chosen due to the following factors: the ordinal nature and potential non-normal distribution of scores for the BDI-I, CES-D, and EDI-I, as well as the categorical, non-parametric nature of the gender variable. Given that Spearman's Rho does not assume normality or linearity and is robust to outliers, it was determined an appropriate method for identifying associations between gender and depression and disordered eating symptomatology. Data was analyzed using IBM SPSS Statistics for Windows (Version 23).

Results

Spearman's Rho correlations were run to identify relationships amongst BDI-I total scores, CES-D total scores, and EDI-I total scores, as well as the EDI-I subscales of body dissatisfaction, ineffectiveness, interpersonal distress, and interoceptive awareness. Spearman's Rho correlation tests were performed to examine associations between disordered eating patterns and depressive symptomatology in both males and females. In the exploration of the rank ordered relationship between depression and eating disorder symptoms as a function of gender, a series of Spearman's Rho correlations in men were explored (see Table 1). In total transparency, not all scales were filled out, so missing data may hinder the accuracy of the relationships found. For men, an expected significant relationship between depression as measured by the BDI-I and CES-D was found, $r = .64$, $p = .005$, $R^2 = 0.41$. Because the primary clinical tool used among patients with suspected depression is the BDI-I, exploration of the relationship of the BDI-I with measures associated with a pathological pattern of eating was considered.

Depressive symptoms as measured by the BDI-I were significantly related to suspicion and distrust of others with significant hesitancy to form close relationships (i.e., interpersonal distrust), $r = .59$, $p = .007$, $R^2 = .35$, a heightened sense of awareness of internal body sensations and stimuli (i.e., interoceptive awareness), $r = .59$, $p = .008$, $R^2 = .35$, and the global assessment of disordered eating patterns and tendencies (i.e., EDI-I total), $r = .53$, $p = .019$, $R^2 = .28$.

For females, depressive symptoms, as measured by the BDI-I, were found to be significantly related to depression as measured by the CES-D, $r = .69$, $p = .002$, $R^2 = .48$ (see Table 2). Depression via the BDI-I was related to body dissatisfaction ($r = .60$, $p = .009$, $R^2 = .36$), while depression via CES-D was related to body dissatisfaction ($r = .48$, $p = .033$, $R^2 = .23$), ineffectiveness ($r = .52$, $p = .019$, $R^2 = .27$), interpersonal distrust ($r = .49$, $p = .027$, $R^2 = .24$), and interoceptive awareness ($r = .62$, $p = .003$, $R^2 = .38$). Depression was also significantly related to the EDI-I total ($r = .57$, $p = .013$, $R^2 = .32$).

Discussion

The following study was conducted to examine the relationship

Table 1
Spearman's Rho correlations for male participants.

Spearman's Rho Correlations			BDI-I Total	CES-D Total	EDI-I Total	BD	IE	ID	IA
	BDI-I Total	Correlation Coefficient	1	.64**	.53*	0.13	0.35	.59**	.59**
		Sig.		0.005	0.019	0.607	0.14	0.007	0.008
	CES-D Total	Correlation Coefficient	.64**	1	0.33	0.02	0.3	0.34	0.35
		Sig.	0.005		0.17	0.925	0.212	0.157	0.147
	EDI-I Total	Correlation Coefficient	.53*	0.33	1	.76**	.75**	.66**	.70**
		Sig.	0.019	0.17		<0.001	<0.001	<0.001	<0.001
	BD	Correlation Coefficient	0.13	0.02	.76**	1	.78**	0.24	0.27
		Sig.	0.607	0.925	0		0	0.184	0.142
	IE	Correlation Coefficient	0.35	0.3	.75**	.78**	1	0.24	.44*
		Sig.	0.14	0.212	<0.001	<0.001		0.192	0.012
	ID	Correlation Coefficient	.59**	0.34	.66**	0.24	0.23	1	.51**
		Sig.	0.007	0.157	<0.001	0.184	0.192		0.002
	IA	Correlation Coefficient	.59**	0.35	.70**	0.27	.44*	.51**	1
		Sig.	0.008	0.147	<0.001	0.142	0.012	0.002	

Note. BDI-I, Beck Depression Inventory-I; CES-D, Center for Epidemiological Studies of Depression; EDI-I, Eating Disorders Inventory-I; BD, Body Dissatisfaction subscale of EDI-I; IE, Ineffectiveness subscale of EDI-I; ID, Interpersonal Distrust subscale of EDI-I; IA, Interoceptive Awareness subscale of EDI-I
** Correlation is significant at $p = .01$
* Correlation is significant at $p = .05$

Table 2
Spearman's Rho correlations for female participants.

Spearman's Rho Correlations			BDI-I Total	CES-D Total	EDI-I Total	BD	IE	ID	IA
	BDI-I Total	Correlation Coefficient	1	.69**	.57*	.60**	0.39	0.1	0.43
		Sig.		0.002	0.013	0.009	0.115	0.706	0.076
	CES-D Total	Correlation Coefficient	.69**	1	.58**	.48*	.52*	.49*	.62**
		Sig.	0.002		0.008	0.033	0.019	0.027	0.003
	EDI-I Total	Correlation Coefficient	.57*	.58**	1	.82**	.76**	.64**	.78**
		Sig.	0.013	0.008		<0.001	<0.001	<0.001	<0.001
	BD	Correlation Coefficient	.58**	.48*	.82**	1	.39*	.36*	.51**
		Sig.	0.009	0.033	<0.001		0.024	0.039	0.002
	IE	Correlation Coefficient	0.39	.52*	.76**	.39*	1	.61**	.63**
		Sig.	0.115	0.019	<0.001	0.024		<0.001	<0.001
	ID	Correlation Coefficient	0.1	.49*	.64**	.36*	.61**	1	.41*
		Sig.	0.706	0.027	<0.001	0.039	<.001		0.016
	IA	Correlation Coefficient	0.43	.62**	.78**	.51**	.63**	.41*	1
		Sig.	0.076	0.003	<0.001	0.002	<0.001	0.016	

Note. BDI-I, Beck Depression Inventory-I; CES-D, Center for Epidemiological Studies of Depression; EDI-I, Eating Disorders Inventory-I; BD, Body Dissatisfaction subscale of EDI-I; IE, Ineffectiveness subscale of EDI-I; ID, Interpersonal Distrust subscale of EDI-I; IA, Interoceptive Awareness subscale of EDI-I

** Correlation is significant at $p = .01$

* Correlation is significant at $p = .05$

between depressive symptoms and disordered eating patterns in a sample of Black men and women living with SCD. While much of the existing literature in this area focuses on white and affluent populations, this study aimed to explore these associations in an understudied, historically marginalized group. Depressive symptoms and disordered eating were hypothesized to be related, and that the patterns would differ by gender. The findings supported this hypothesis, revealing distinct gender-based associations between depression and disordered eating habits.

In a manner consistent with previous literature, the BDI-I and CES-D are significantly related but assess depression in a manner that could warrant the use of both measures in a clinical setting. As an addition to the literature, this study found that there were more significant factors delineated in the relationship of depressive symptoms to eating disordered symptoms in men than women.

Among Black men with SCD, depressive symptoms were significantly related to interpersonal distrust and interoceptive awareness, highlighting difficulty in recognizing and accurately interpreting internal body signals. These results suggest that for men, depression may manifest through increased somatic focus and mistrust in interpersonal settings. Contrary to the concept of "healthy paranoia," which posits that guardedness may be adaptive for Black men navigating societal challenges, the findings indicated that interpersonal distrust was associated with greater emotional distress. This suggests that Black men with SCD may exhibit maladaptive expressions of depression potentially complicating relationships. Clinicians should be aware that rapport may be compromised by such factors, and connecting interpersonally to the target of interventions may require additional therapeutic and clinical efforts.

Additionally, the somatic aspects of depression such as bodily discomfort and heightened awareness of physical sensations like pain or hunger, appeared more prominent in men with SCD. Although not explored in such a limited sample, the increase in somatic focus among Black men who are depressed is consistent with the current state of literature. This study's findings, however, suggest that reports of interoceptive experience may be an excellent barometer of depressed mood in Black men with SCD. Additionally, men who constantly report such experiences who dismiss traditional paths of resolution, may be depressed and require mental health interventions.

In women, only one disordered eating pattern had a meaningful relationship to depression: body dissatisfaction. As depression increases, body dissatisfaction increases in Black women with SCD. This relationship was not found to be significant in Black men with the same disorder. This negative processing bias that yields such a relationship is consistent with many of the cognitive errors that occur in the body of individuals

who are depressed. Substantial over- or under-estimates of body proportions as captured by body dysmorphic disorder represent a continuum of cognitive errors that traverse through normal mood into depression. This characteristic only appeared in women, so future studies must strive to understand the biology, socialization, acculturation, and other factors that produce and support such gender differences. All gender differences in eating disorder-related factors that correlated to depression occurred in the context of similar percentages of variance accounted for in depression by disordered eating tendencies.

Limitations

Several limitations of the current study should be noted. First, the sample size was small ($N = 37$) compared to larger epidemiological studies, with a notable gender imbalance (30 women and only 7 men). This significantly limited our statistical power to detect gender differences reliably and restricts the generalizability of findings related to men with SCD and any gender-based comparisons. We note, however, that prior to larger, more prospective studies, someone must note, identify, and then document the clinical or research observation in a manner that subsequent studies can be done. We believe that we are that first opportunity to document an important observation that can be explored and replicated with future scientific explorations.

Second, the study employed a cross-sectional design, which limits the ability to infer causal relationships between depressive symptoms and disordered eating patterns. Future longitudinal research would be necessary to clarify whether factors like body dissatisfaction precede the onset of depressive symptoms or vice versa. We note that our study, like most observations derived from archival data in rare diseases, used existing data where we inherited both the benefits and shortcomings of the initial study. Although a limitation, we do not believe that this point diminishes our findings or the value of the observation. Detailed demographic variables such as age and clinical diagnoses of depression or eating disorders were not accessible. While all participants had a confirmed diagnosis of SCD and provided responses on the self-report measures used, the absence of more detailed clinical and demographic data limits the specificity and generalizability of our findings. Future research should aim to include comprehensive participant characteristics to allow for a more nuanced interpretation of depression and disordered eating patterns in this population.

Third, we were unable to control several potential confounding variables, such as age, SCD severity, socio-economic status, co-occurring mental health diagnoses, and medication used in such a small sample without limiting the scale of analytical cells below a rational size for meaningful analyses. These variables may influence both body image

and depression and should be more carefully measured and controlled in future studies to isolate the relationships of interest.

The use of self-report instruments (including EDI-I, BDI-I, and CES-D) introduces the possibility of response biases such as social desirability or underreporting, especially in sensitive domains like mental health and body image. These tools, while widely used, are subject to subjective interpretation and potential inaccuracies, which should be considered when interpreting the findings. We note that our study is well within the scope of what is reasonable in both research and clinical practice, and hence, believe the use of self-report measures is more of an aspirational observation for studies well into the future where self-report is replaced by diagnostic interviews, brain scans and other technologies. For today, however, our use of self-report measures is well within the functional scope of research conducted in this area. For example, the potential conceptual and psychometric overlap between depressive symptoms and body dissatisfaction, is noted but few studies have managed to disentangle the complicated shared variance between these constructs. We note that same for the overlap of depression and anxiety, and across most psychiatric disorders. Although the overlap could contribute to artificially elevated associations between the constructs, our study represents an ecologically valid model of what is likely to be seen in clinic- few if any patients will be seen as a single body dysmorphic, mood disorder, or other diagnosis without overlap.

Although our sample was composed exclusively of Black adults with SCD, we did not fully explore the influence of cultural, racial, or socioeconomic context on depressive symptoms, body dissatisfaction, or help-seeking behaviors. These factors may significantly shape how individuals experience and express psychological distress and should be more explicitly considered in future research to enhance cultural and contextual relevance.

The authors would like to add the limitation of using an older model of the Beck Depression Inventory, while there are differences between BDI-I and BDI-II, and BDI-III, we believe that our findings remain relevant and sufficient to inform and guide future research to fulfill the gap in SCD literature. Although confirming clinical observations across our team of healthcare providers, we recommend caution before integrating our findings into this area as truth. We believe that both reporting and interpreting the findings as we have is warranted as the inspiration for replication and extension of what we have presented.

Conclusion

The current paper is significant because the list of health risks and comorbidities associated with eating disorders is extensive. Eating disorders are accompanied by a plethora of medical and psychiatric comorbidities. Non-specific, minor medical complaints commonly seen in eating disorder patients are fatigue, bloating, constipation, edema, heart palpitations, and dizziness/fainting (Stice et al., 2004). These findings may be the first to associate disordered eating with depression in Black men and women with SCD. There is limited research provided on the relationship between disordered eating patterns and depression in chronically ill populations. Even fewer studies have examined these variables within the sickle cell population with specific emphasis on how these experiences place patients at risk for compounded health challenges. Understanding how depressive symptoms interact with disordered eating in individuals with SCD, especially in underrepresented groups such as Black men and women, may help inform more culturally responsive and targeted mental health interventions. Given the chronic physical burden of SCD and its overlap with the somatic and emotional components of both depression and disordered eating, future research should continue to investigate these intersections. Additionally, physicians treating patients with SCD should ensure not only provide treatment for the patient's physical health implications but also address their psychological symptoms. Replication and expansion of these findings in larger, more diverse samples is needed to validate these patterns and explore their clinical implications.

CRediT authorship contribution statement

Deja Buckner: Writing – original draft, Conceptualization. **Bridgette Pittman Blackwell:** Writing – review & editing, Writing – original draft. **John J. Sollers:** Methodology, Formal analysis. **W. Jeff Bryson:** Supervision, Investigation. **Alexandria McDougald:** Writing – review & editing. **Mary Wood:** Methodology, Investigation, Formal analysis, Data curation. **Camela S. Barker:** Methodology, Investigation, Formal analysis, Data curation. **Jessica Miller:** Data curation. **Elaine Whitworth:** Writing – original draft, Data curation. **Erika N. Cubilete:** Writing – review & editing, Writing – original draft. **Jenny Norris:** Writing – review & editing. **Danielle May:** Writing – review & editing, Conceptualization. **Meredyth Galliher:** Writing – review & editing. **Beyonnshea N. Lucas:** Writing – review & editing. **Cara Green:** Writing – review & editing. **Erika Cubilete:** Writing – review & editing. **Ben Bayan:** Writing – review & editing. **Ashley Lopez:** Writing – review & editing, Writing – original draft. **John J. Sollers:** Writing – review & editing. **Malik Muhammad:** Writing – original draft, Validation, Data curation. **Asha Lockett:** Writing – review & editing, Writing – original draft. **Jasmine Benner:** Writing – review & editing, Writing – original draft. **Noa Wax:** Writing – review & editing, Writing – original draft. **Samantha Beavers:** Writing – review & editing, Conceptualization. **Wandy Cubilete:** Writing – review & editing, Conceptualization. **Suquey Castillo-Lopez:** Writing – review & editing, Writing – original draft. **Jeneishka Torres Rivera:** Writing – review & editing, Writing – original draft. **Camryn Cutchin:** Writing – review & editing, Writing – original draft. **Goldie Byrd:** Writing – original draft, Methodology, Conceptualization. **Dwayne Brandon:** Methodology. **Stephanie Johnson:** Methodology. **Joseph L. Kennedy:** Writing – review & editing. **Sherry Eaton:** Writing – original draft, Methodology. **Brianna Downey:** Writing – review & editing, Methodology. **Jonathan Livingston:** Writing – original draft, Methodology, Conceptualization. **Debra O. Parker:** Writing – original draft, Methodology, Conceptualization. **Raymona Lawrence:** Writing – review & editing, Writing – original draft, Conceptualization. **Shiv Sudhakar:** Supervision, Methodology, Conceptualization. **Richard Boorst-Marx:** Writing – original draft, Supervision, Methodology. **Elwood Robinson:** Writing – original draft, Methodology, Conceptualization. **Ify Osunkwo:** Writing – review & editing, Writing – original draft, Conceptualization. **Christopher L. Edwards:** Writing – original draft, Visualization, Methodology, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

References

Addis, G., Spector, R., Shaw, E., Musumadi, L., Dhanda, C., 2007. The physical, social and psychological impact of priapism on adult males with sickle cell disorder. Chronic. Illn. 3 (2), 145–154. https://doi.org/10.1177/1742395307081505.

Brandow, A.M., Farley, R.A., Panepinto, J.A., 2014. Neuropathic pain in patients with sickle cell disease. Pediatr. Blood Cancer 61 (3), 512–517. https://doi.org/10.1002/pbc.24838.

Birk, J.L., Kronish, I.M., Moise, N., Falzon, L., Yoon, S., Davidson, K.W., 2019. Depression and multimorbidity: considering temporal characteristics of the associations between depression and multiple chronic diseases. Health Psychol. 38 (9), 802–811.

Garner, D.M., Olmstead, M.P., Polivy, J., 1983. Development and validation of a multidimensional eating disorder inventory for anorexia nervosa and bulimia. Int. J. Eat. Disord. 2 (2), 15–34. https://doi.org/10.1002/1098-108X(198321)2:2<15::AID-EAT2260020203>3.0.CO;2-6.

Gibson, R.C., Morgan, K.A.D., Abel, W.D., Sewell, C.A., Martin, J.S., Lowe, G.A., Haye, W.D.L., Edwards, C.L., O'Garo, K.N., Reid, M.E., Asnani, M.R., 2013. Locus of control, depression and quality of life among persons with sickle cell disease in Jamaica. Psychol. Health Med. 18 (4), 451–460. https://doi-org.ezproxy.nccu.edu/10.1080/13548506.2012.749353.

Raji, S.O., Lawani, A.O., James, B.O., 2016. Prevalence and correlates of major depression among Nigerian adults with sickle cell disease. Int. J. Psychiatry Med. 51 (5), 456–466. https://doi-org.ezproxy.nccu.edu/10.1177/0091217416680839.

Reddy, S., Edwards, C., Wood, M., O'Garo, K., Morgan, K., Edwards, L., Whitfield, K., 2011. Body image in a sample of adult African American males and females with sickle cell disease (SCD). J. Afr. Am. Stud. 15 (1), 115–119. Retrieved March 4, 2021, from. http://www.jstor.org/stable/43525412.

Simon, G.E., Von Korff, M., Lin, E., 2005. Clinical and functional outcomes of depression treatment in patients with and without chronic medical illness. Psychol. Med. 35 (2), 271–279. https://doi-org.ezproxy.nccu.edu/10.1017/S0033291704003071.

Stice, E., Fisher, M., Martinez, E., 2004. Eating disorder diagnostic scale: additional evidence of reliability and validity. Psychol. Assess. 16 (1), 60–71. https://doi-org.ezproxy.nccu.edu/10.1037/1040-3590.16.1.60.

Storch, E.A., Roberti, J.W., Roth, D.A., 2004. Factor structure, concurrent validity, and internal consistency of the Beck Depression Inventory-second edition in a sample of college students. Depress. Anxiety. 19 (3), 187–189. https://doi-org.ezproxy.nccu.edu/10.1002/da.20002.

Thombs, B., Ziegelstein, R., Pilote, L., Dozois, D., Beck, A., Dobson, K., Abbey, S., 2010. Somatic symptom overlap in Beck Depression Inventory–II scores following myocardial infarction. British J. Psychiatry 197 (1), 61–65. https://doi.org/10.1192/bjp.bp.109.076596.

Toledano-Toledano, F., Contreras-Valdez, J.A., 2018. Validity and reliability of the Beck Depression Inventory II (BDI-II) in family caregivers of children with chronic diseases. PLoS. One 13 (11). https://doi-org.ezproxy.nccu.edu/10.1371/journal.pone.0206917.