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Disordered Eating, Food Insecurity, and Weight Status Among Transgender and Gender Nonbinary Youth and Young Adults: A Cross-Sectional Study Using a Nutrition Screening Protocol

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Abstract

Purpose: The purpose of this study was to describe the prevalence of and relationships among disordered eating, food insecurity, and weight status among transgender and gender nonbinary youth and young adults.

Methods: This cross-sectional study involved a screening protocol to assess disordered eating and food insecurity risk from September to December of 2019 at a gender clinic using five validated measures: (1) previous eating disorder diagnosis (yes/no); (2) Sick, Control, One Stone, Fat, Food Questionnaire (SCOFF); (3) Adolescent Binge Eating Disorder Questionnaire (ADO-BED); (4) Nine-Item Avoidant/Restrictive Food Intake Disorder Screen (NIAS); and (5) Hunger Vital Sign. Age, assigned sex at birth, gender identity, stage of medical transition, and body mass index were collected. Pearson’s $r$ correlation coefficients, between-groups $t$-tests, one-way analysis of variance tests, and Tukey’s honest significant difference test were used to characterize the relationships between variables.

Results: A total of 164 participants ages 12–23 years completed the screener. Using assigned sex at birth, 1.8% were underweight, 53% were a healthy weight, 17.1% were overweight, and 28.0% were obese. An estimated 8.7% reported a previous eating disorder diagnosis, 28.0% screened positive on the SCOFF, 9.1% on the ADO-BED, 75.0% on the NIAS, and 21.2% on the Hunger Vital Sign. Transgender males scored higher on the NIAS than transgender females ($p=0.03$). Those with a previous eating disorder diagnosis scored significantly higher on the Hunger Vital Sign ($p<0.05$).

Conclusion: Gender clinics should routinely screen for disordered eating, food insecurity, overweight, and obesity to identify patients in need of further evaluation and referral.

Keywords: adolescence, clinical care, eating-related pathology, health screening, obesity/overweight, transgender

Introduction

Multiple investigators have emphasized the need to screen transgender and gender nonbinary (TGNB) youth for eating disorders given the increased prevalence of disordered eating behaviors and body dissatisfaction compared with cisgender youth.1–9 Among high school students in Massachusetts, transgender adolescents were over twice as likely to report fasting for more than 24 hours, over eight times more likely to report use of diet pills, and over seven times more likely to report laxative use compared with cisgender males.6 In an online sample of Canadian youth, 42% of 14–18 year old transgender youth reported binge eating, 48% reported fasting, 7% used diet pills, 5% used laxatives, and 18% vomited to lose weight in the last year.9 Among college students in the United States, transgender...
students were over four times more likely to self-report an eating disorder diagnosis and over twice as likely to have used diet pills, vomiting, or laxatives in the past month compared with cisgender heterosexual women.14

Disordered eating and weight management behaviors may be elevated among TGNB youth for a variety of reasons, including the desire to attain attributes of body size and shape associated with one’s gender identity, to suppress pubertal development of secondary sex characteristics that are not consistent with one’s gender identity, to mask the presence of breasts and hips through additional adiposity, or as a coping mechanism for gender-related stigma and distress.15–19 TGNB youth, particularly transgender males, may seek a larger body size that is distinguished by muscularity, as has been reported with cisgender males, or that is simply perceived as more masculine due to size alone.10–12 As a result, management of disordered eating among transgender youth is complex given the psychiatric and medical implications distinct to this group.5

It is salient that the majority of published studies have not utilized validated eating disorder screeners, but rather a selection of questions related to disordered eating behaviors. The existing research is further limited by the fact that most eating disorder screeners have been validated with cisgender female populations, whereas no screeners have been validated with TGNB populations.5 Nonetheless, the need for screening TGNB youth at both gender clinics and primary care clinics that serve sexual and gender minority youth has been emphasized repeatedly.1,3–7,9

Disordered eating, particularly binge eating, often intersects with food insecurity. Food insecurity has been associated with an increased likelihood of binge eating disorder, obesity, compensatory behaviors, and food hiding.13–15 Predictors of food insecurity among adults include poverty, unemployment, low minimum wage, low education, lack of home ownership, lack of savings, and poor health status.16 Findings from a national survey revealed that the unemployment rate among transgender adults (15%) was three times higher than the rate among the general United States adult population (5%), and that the poverty rate among transgender adults (29%) was more than double the rate among the general adult population (12%).17 Among sexual and gender minority youth accessing crisis services, nearly one-third (32%) had experienced lifetime homelessness.18 Additional barriers to accessing food resources include fear of discrimination at food banks, especially those operated by faith-based organizations, and competing financial priorities when saving for gender-affirming surgeries.19

Food insecurity has been suggested as a relevant concern among TGNB youth given the intersection with family rejection, homelessness, and poverty.20 In a national survey of service providers, family rejection due to sexual orientation or gender identity was the most frequently cited contributor to homelessness among LGBT youth.21 However, the extant literature has yet to directly assess food insecurity among TGNB youth.

The purpose of this study was to describe the prevalence of disordered eating, food insecurity, and weight categories and (2) characterize the relationships among disordered eating, food insecurity, body weight, age, gender identity, and stage of medical transition.

Methods

This cross-sectional study involved a nutrition screening protocol at an adolescent gender clinic and additional patient data collected through the electronic medical records.

Nutrition screening protocol

Returning patients at an adolescent gender clinic were screened for disordered eating and food insecurity during standard clinic visits. Referrals were made to adolescent medicine and case management, respectively. The screening protocol is illustrated in Figure 1.

Participants

A total of 164 participants ages 12–23 years completed the screener from September to December 2019. The Washington University in St. Louis Institutional Review Board approved this study. A waiver of consent was approved given that the nutrition screener is the standard of care at the gender clinic.

Measures

The nutrition screener was a compilation of five measures related to disordered eating and food insecurity. The measures were selected given their validation across multiple population groups and brevity relative to other measures. The measures included the following:

1. Yes/no question regarding previous diagnosis of an eating disorder;
2. Sick, Control, One Stone, Fat, Food Questionnaire (SCOFF): a five-question measure that addresses features of anorexia nervosa and bulimia nervosa among adolescents and adults22;
3. Adolescent Binge Eating Disorder Questionnaire (ADO-BED): a five-question measure that addresses features of binge eating disorder among adolescents23;
4. Nine-Item Avoidant/Restrictive Food Intake Disorder Screen (NIAS): a nine-question measure that addresses features of avoidant/restrictive food intake disorder among adolescents and adults24;
5. Hunger Vital Sign: a two-question measure designed to screen for food insecurity among adolescents and adults.25

Cutoffs for positive screens on each measure were two or more “yes” responses on the SCOFF; “yes” to questions one or two, plus six or more affirmative responses to questions three through six on the ADO-BED; three or higher on one or more question on the NIAS; and a response of “often true” or “sometimes true” on at least one question of the Hunger Vital Sign.22–25

Additional patient data were collected from the electronic medical record including age, assigned sex at birth, gender identity, stage of medical transition with respect to hormone therapy, and body mass index (BMI). Assigned sex at birth was characterized as assigned female at birth or assigned male at birth. Gender identity was characterized as transgender

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female, transgender male, or nonbinary based on self-report and assigned sex at birth in the electronic medical record. Hormone therapy was reported by type as feminizing, masculinizing, or puberty blockers only.

For patients 19 years of age and younger, BMI-for-age was reported using descriptive statistics, interpreted on the growth chart consistent with assigned sex at birth, and categorized as underweight (<5th percentile), healthy weight (≥5th to <85th percentile), overweight (≥85th to <95th percentile), or obese (≥95th percentile) using the Centers for Disease Control and Prevention’s (CDC)’s guidelines for children and adolescents.26

For patients 19 years of age and younger, BMI was interpreted on the growth chart consistent with assigned sex at birth if the patient had not begun to medically transition or was on puberty blockers only. If the patient had begun to medically transition, BMI-for-age using both the female and male growth charts were reported using descriptive statistics and categorized using the CDC’s guidelines for children and adolescents.26

For patients 20 years of age and older, BMI was reported using descriptive statistics and categorized as underweight (<18.5), healthy weight (18.5 to <25), overweight (25 to <30), or obese (≥30) per the CDC’s guidelines for adults.27 This approach to assessing weight status reflects the strategy utilized by providers at the gender clinic.

Analysis

All analyses were conducted using R statistical computing environment.28 To determine the relationships between study variables, Pearson’s r correlation coefficients were computed. To compare differences in food insecurity and disordered eating based on participants having previously been diagnosed with an eating disorder, between-groups t-tests were used. In addition, one-way analysis of variance (ANOVA) tests were used to investigate the differences in disordered eating and food insecurity among subgroups of different gender identities. If a significant ANOVA was returned (i.e., p < 0.05), Tukey’s honest significant difference (HSD) test was used to reveal where significant differences exist.

Descriptive statistics were used to characterize the prevalence of disordered eating, food insecurity, and weight status. Table 1 provides the means, standard deviations (SD), and Pearson’s r correlation coefficients between the variables included in this study. These correlations reflect the zero-order bivariate relationships between two variables such that a positive correlation indicates a positive linear relationship and a negative correlation indicates a negative linear relationship between the two variables. Between-groups t-tests, one-way ANOVA, and Tukey’s HSD were used to characterize the relationships between variables.

Results

Demographic and anthropometric characteristics

A total of 164 participants ages 12–23 years completed the screener. The average age was 17.0 years (SD = 2.3). Regarding gender identity, 78.0% identified as transgender male, 17.1% as transgender female, and 4.9% as nonbinary. The majority (78.4%) had begun to medically transition with hormone therapy. Of these, 14.6% were on feminizing hormone therapy, 62.0% were on masculinizing hormone therapy, and 1.8% were on puberty blockers only.

Mean BMI was 25.1 (SD = 6.6) among adults ages 20 years and older. Mean BMI-for-age among youth ages 19 and younger was at the 70.2nd percentile (SD = 25.4) using the growth chart consistent with assigned sex at birth and the 60.3rd percentile (SD = 34.0) using the growth chart consistent with gender identity. Using assigned sex at birth, 6.7% of assigned male at birth youth and young adults were underweight, 66.7% were at a healthy weight, 10.0% were overweight, and 16.7% were obese. Among assigned female at birth youth and young adults, 0.7% were underweight,
50.0% were at a healthy weight, 18.7% were overweight, and 30.6% were obese (Fig. 2). Among the entire sample, 1.8% were underweight, 53% were at a healthy weight, 17.1% were overweight, and 28.0% were obese.

Prevalence of disordered eating and food insecurity

Among the sample, 8.7% reported a previous diagnosis of an eating disorder, 28.0% screened positive on the SCOFF, and 9.1% screened positive on the ADO-BED. The majority (75.0%) screened positive on the NIAS. Approximately one out of five (21.2%) screened positive on the Hunger Vital Sign.

Relationships among disordered eating and gender identity, age, BMI, and hormone therapy

Initial investigation of the effect of gender identity on SCOFF (Table 2) revealed a significant ANOVA ($F=3.44$, $p=0.03$); however, Tukey’s HSD follow-up test did not provide evidence of significant differences among any of the gender categories on their SCOFF scores. Transgender male participants scored 0.92 U higher on the SCOFF than nonbinary participants, but the difference was nonsignificant ($p=0.08$). In addition, age and BMI were not related to the SCOFF, per the correlations found in Table 1. Lastly, there was no significant difference on the SCOFF between those who had begun to medically transition and those who had not ($t=0.94$, $p=0.35$; Table 3).

Regarding the ADO-BED, scores did not statistically significantly differ based on gender identity ($F=2.91$, $p=0.06$; Table 2). Despite not reaching statistical significance, transgender male participants scored 1.28 U higher on the ADO-BED than transgender female participants, per Tukey’s HSD follow-up test ($p=0.11$). A significant positive correlation between BMI and ADO-BED ($r=0.25$) suggested that those with a higher BMI also score higher on the ADO-BED (Table 1). ADO-BED did not have a significant relationship with age. Lastly, participants did not differ on ADO-BED based on whether they went through a medical transition ($t=1.83$, $p=0.07$; Table 3).

Regarding the NIAS, Table 2 shows a significant ANOVA, indicating a significant difference among gender identity groups on the NIAS ($F=4.58$, $p=0.01$); Tukey’s HSD was used as a follow-up test to determine where differences on the NIAS exist. These results show that a significant difference existed on the NIAS in that transgender males scored 1.15 U higher on the NIAS than transgender females ($p=0.03$). Among youth that had transitioned with hormone therapy, there was a significant negative correlation between BMI and NIAS scores. As depicted in Table 3, no difference in NIAS was found between those undergoing a medical transition with feminizing...
hormone therapy, masculinizing hormone therapy, and/or puberty blockers, and those who were not ($t = 1.18, p = 0.25$).

**Relationships among food insecurity and gender identity, age, BMI, and hormone therapy**

No significant difference was found among gender identity groups on the Hunger Vital Sign ($F = 2.17, p = 0.12$; Table 2). Similarly, no significant relationship was found between the Hunger Vital Sign scores and age or BMI (Table 1). Regarding medical transition, no difference was found on the Hunger Vital Sign scores between those using hormone therapy and those who were not (Table 3). A significant ANOVA indicated a significant effect of previous eating disorder diagnosis and scores on the Hunger Vital Sign ($F = 3.08, p < 0.05$). Tukey’s HSD test revealed that those previously diagnosed with an eating disorder scored 0.47 U higher on the Hunger Vital Sign than those not previously diagnosed with an eating disorder ($p < 0.05$).

**Discussion**

**Weight status**

An estimated 28.0% of participants were obese compared with 20.6% of adolescents aged 12–19 years with obesity in the United States.29 Thus, the prevalence of obesity among all TGNB youth and young adults was greater than that in the general population. However, based on assigned sex at birth, approximately one in six (16.7%) assigned male at birth youth and young adults were obese, whereas almost one in three (30.6%) assigned female at birth youth and young adults were obese. Therefore, obesity was more prevalent among assigned female at birth TGNB individuals and yet less prevalent among assigned male at birth TGNB individuals compared with the general population. This finding is consistent with existing research that TGNB high school students are more likely to be overweight or obese compared with cisgender students, especially assigned female at birth TGNB individuals.30

**Eating disorder prevalence**

We utilized self-report of an eating disorder diagnosis and multiple validated screeners to characterize the eating disorder prevalence among our patient population of TGNB youth and young adults. Among the study sample, 8.7% of participants reported a previous diagnosis of an eating disorder. This finding was within existing estimates ranging from 2% to nearly 18%.3 In a study of over 1300 youth ages 10 to 17, 4.3% of trans-masculine youth and 4.2% of trans-feminine youth reported a lifetime eating disorder diagnosis.2 In a national study of college students, 1.52% of transgender participants reported past-year diagnosis of or treatment for an eating disorder.4 Given the proportion of patients in this study that reported a previous eating disorder diagnosis and the overlap of providers at both gender clinics and eating disorder treatment teams, such as adolescent medicine, psychology, psychiatry, nutrition, and case management, providers in various settings may consider using this one-item question to identify patients that have been diagnosed with an eating disorder to enhance the continuity of care.

Numerous eating disorder screeners have been validated with general adolescent and adult populations, although no screeners have been validated with TGNB populations. Avila et al. utilized the EDE-Q to assess for eating disorder psychopathology among youth and young adults presenting at a gender clinic; 15% had elevated EDE-Q scores and 63% reported weight manipulation for gender-affirming purposes.1 In this study, we selected multiple eating disorder screeners given the relative brevity of each and their specificity to eating disorder types. Among the study sample, 28% of participants screened positive for anorexia nervosa or bulimia nervosa on the SCOFF, 9.1% screened positive for binge eating disorder on the ADO-BED. In comparison, the lifetime prevalence estimates of anorexia nervosa, bulimia nervosa, and binge eating disorder are 0.3%, 0.9%, and 1.5%, respectively.31 Population norms have ranged from 3.6% to 20.5% on the SCOFF among college students, including 13.4% among gender minority college students, and 22.3% to 27.6% on the ADO-BED among obese adolescents.23,32,33

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**Table 2. Means, Standard Deviations, and One-Way Analysis of Variance Tests for Gender Identity, Disordered Eating, and Food Insecurity**

<table>
<thead>
<tr>
<th>Measure</th>
<th>TM M</th>
<th>SD</th>
<th>TF M</th>
<th>SD</th>
<th>NB M</th>
<th>SD</th>
<th>$F(2, 158)$</th>
<th>Eta-squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCOFF</td>
<td>1.05</td>
<td>1.25</td>
<td>0.63</td>
<td>0.84</td>
<td>0.12</td>
<td>0.35</td>
<td>3.44*</td>
<td>0.04</td>
</tr>
<tr>
<td>ADO-BED</td>
<td>3.02</td>
<td>3.05</td>
<td>1.74</td>
<td>2.78</td>
<td>1.29</td>
<td>1.7</td>
<td>2.91</td>
<td>0.04</td>
</tr>
<tr>
<td>NIAS</td>
<td>2.80</td>
<td>2.92</td>
<td>1.64</td>
<td>1.57</td>
<td>1.25</td>
<td>1.58</td>
<td>4.58*</td>
<td>0.05</td>
</tr>
<tr>
<td>Hunger</td>
<td>0.41</td>
<td>0.76</td>
<td>0.19</td>
<td>0.56</td>
<td>0.00</td>
<td>0.00</td>
<td>2.17</td>
<td>0.03</td>
</tr>
</tbody>
</table>

*Indicates statistical significance at $p < 0.05$.

NB, non-binary; TF, transgender female; TM, transgender male.

**Table 3. Differences in Disordered Eating and Food Insecurity Based on Medical Transition**

<table>
<thead>
<tr>
<th>Measure</th>
<th>Medical transition: yes M</th>
<th>SD</th>
<th>Medical transition: no M</th>
<th>SD</th>
<th>t</th>
<th>p</th>
<th>Cohen’s d</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCOFF</td>
<td>0.88</td>
<td>1.14</td>
<td>1.12</td>
<td>1.34</td>
<td>0.94</td>
<td>0.35</td>
<td>-0.18</td>
</tr>
<tr>
<td>ADO-BED</td>
<td>2.49</td>
<td>2.99</td>
<td>3.55</td>
<td>2.92</td>
<td>1.83</td>
<td>0.07</td>
<td>-0.36</td>
</tr>
<tr>
<td>NIAS</td>
<td>2.42</td>
<td>2.26</td>
<td>2.91</td>
<td>2.20</td>
<td>1.18</td>
<td>0.25</td>
<td>-0.22</td>
</tr>
<tr>
<td>Hunger</td>
<td>0.55</td>
<td>0.73</td>
<td>0.35</td>
<td>0.69</td>
<td>0.00</td>
<td>0.99</td>
<td>0.00</td>
</tr>
</tbody>
</table>

“Medical Transition” refers to the use of feminizing hormone therapy, masculinizing hormone therapy, and/or puberty blockers.
In addition, 75.0% screened positive for avoidant/restrictive food intake disorder on the NIAS, compared with population estimates ranging from 1.5% to 64% in clinical eating disorder populations and <1% to 15.5% in nonclinical populations. Transgender males scored significantly higher on the NIAS compared with transgender females. Relatedly, avoidant/restrictive food intake disorder prevalence may be greater among cisgender males than females, although prevalence estimates vary widely. Avoidant/restrictive food intake disorder has yet to be explored among TGNB populations and warrants further research.

Eating disorders and gender identity, BMI, and medical transition

Numerous studies have explored the relationships among eating disorders, gender identity, BMI, and medical transition. In this study, there was no significant relationship among gender identity and SCOFF or ADO-BED scores, although transgender males scored significantly higher on the NIAS than transgender females. BMI correlated positively with ADO-BED scores, which is expected given the correlation with overweight and obesity. However, BMI did not correlate with scores on the SCOFF, despite screening for anorexia nervosa where an underweight BMI may be expected. This finding suggests that subclinical eating disorders or disordered eating may persist despite weight status. BMI correlated negatively with NIAS scores, which is expected given that avoidant/restrictive food intake disorder may result in weight loss or failure to gain weight. Lastly, existing research suggests a mitigating effect of hormone therapy on eating disorder risk. The yes/no question regarding previous diagnosis, nor did we query which type of eating disorder patients had been diagnosed with in the past. Although we utilized screeners that have been validated with the general population, no screeners have been validated with TGNB populations, despite known eating considerations distinct from the cisgender population. Furthermore, although the ADO-BED is validated with adolescents, it has not yet been validated with young adults; however, the clinical interview used to validate the measure was based on the adult criteria for binge eating disorder. We also note the lack of a control group and lack of clear approach in utilizing male or female growth charts as limitations, particularly as we attempted to compare our findings to existing research. Lastly, the relatively small number of nonbinary participants (4.9%) precluded further disaggregation by assigned sex at birth for this subgroup.

Food insecurity prevalence

Food insecurity is estimated to impact 10.5% of households nationally. In this study, approximately twice as many participants (21.2%) screened positive for food insecurity compared with the national average. This difference may be due to disparities in unemployment and extreme poverty experienced by the adult transgender population, and barriers to accessing food resources such as fear of discrimination at food banks and competing financial priorities when saving for gender-affirming health care. Notably, the existing research centers on the adult TGNB population; predictors of food security among TGNB youth warrant further exploration into potential factors such as family rejection, homelessness, and employment status.

Those with a previous eating disorder diagnosis scored significantly higher on the Hunger Vital Sign, suggesting a compounding effect of an eating disorder diagnosis on food insecurity risk. There was a significant relationship between food insecurity and ADO-BED scores, which is consistent with existing studies demonstrating a relationship among food insecurity, binge eating disorder, obesity, compensatory behaviors, and food hiding. Given the proportion of participants that screened positive for food insecurity, gender clinics and other sites that serve TGNB youth and young adults may consider screening for food insecurity routinely. Clinics may need to be prepared to refer patients to area resources, with attention to those that have antidiscriminatory policies toward sexual and gender minority populations.

Strengths and limitations

Study strengths include the use of validated screeners and a relatively wide age range to include both adolescents and young adults. We found the selected screeners to be practical given their relative brevity and noted that patients had adequate time to complete the screeners during their visit with minimal disruption to the clinic workflow.

The study was limited in that the screeners suggest eating concerns, but do not provide an actual eating disorder diagnosis, nor did we query which type of eating disorder patients had been diagnosed with in the past. Although we utilized screeners that have been validated with the general population, no screeners have been validated with TGNB populations, despite known eating considerations distinct from the cisgender population. Furthermore, although the ADO-BED is validated with adolescents, it has not yet been validated with young adults; however, the clinical interview used to validate the measure was based on the adult criteria for binge eating disorder. We also note the lack of a control group and lack of clear approach in utilizing male or female growth charts as limitations, particularly as we attempted to compare our findings to existing research. Lastly, the relatively small number of nonbinary participants (4.9%) precluded further disaggregation by assigned sex at birth for this subgroup.

Clinical recommendations

Gender clinics may consider adopting a screening protocol that addresses eating disorder risk and food insecurity (Fig. 1). Considerations within the workflow should include how the screener will be administered; who will collect and score the screener; how the information will be documented in the medical record; how often the screener will be given; and how the positive screens will be addressed. Clinics should ensure that any referrals or connections to area resources are vetted as safe and inclusive options for TGNB patients.

We found the use of multiple short screeners (SCOFF, NIAS, and ADO-BED) to be effective at identifying risk for specific conditions, versus longer screeners that suggest general eating disorder risk. The yes/no question regarding previous eating disorder diagnosis was helpful to follow-up with at the clinic visit and promote continuity of care. In a most pragmatic sense, the five measures we used could fit on a double-sided page and be completed easily during the clinic visit.

Future research

Further research is needed to inform a gender-affirming approach to eating disorder assessment and management among TGNB youth and young adults. Future studies may
compare the results of screenings to actual diagnoses, provide validation of selected screeners for use with TGNB populations, and explore aspects of food insecurity that may be distinct from those affecting the cisgender population, especially among TGNB youth. Given that this is the first report of the NIAS, ADO-BED, and Hunger Vital Sign among TGNB populations, future studies may test hypotheses related to eating disorder risk compared with cisgender populations using these clinical measures.

Conclusions

Eating disorders, food insecurity, overweight, and obesity are important clinical concerns for TGNB youth and young adults. Gender clinics should utilize validated screeners to identify patients in need of further evaluation and referral. Future research is needed to inform a gender-affirming approach to eating disorder management, weight management, and food security assistance for TGNB populations.

Authors’ Contributions

W.R.L, J.L.R, A.M.G, C.B.L., and S.K.G. designed the study and the nutrition screening protocol. J.L.R. administered the screeners and W.R.L. scored them. I.M.K. completed the statistical analyses and wrote the results section. W.R.L. wrote the remaining article sections with input from all authors. All authors reviewed and approved the article.

Disclaimer

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Author Disclosure Statement

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References


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