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ORIGINAL ARTICLE

Identifying Risk Factors for Disordered Eating among Female Youth in Primary Care

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Abstract

Eating disorders are a serious, life-threating condition impacting adolescents and young adults. Providers in primary care settings have an important role in identifying disordered eating (DE) symptoms. Unfortunately, symptoms go undetected in 50% of patients in medical settings. Using the behavioral health screen, this study identified DE risk profiles in a sample of 3620 female adolescents and young adults (ages 14–24), presenting in primary care. A latent class analysis with twenty psychosocial factors identified three DE risk groups. The group at highest risk for DE was characterized by endorsement of internalizing symptoms and a history of trauma. The next risk group consisted of those with externalizing symptoms, particularly substance use. The group at lowest risk for DE reported more time spent with friends compared to their peers. Primary care providers and psychiatric teams can benefit from knowing the psychosocial risk patterns affiliated with DE, and using brief, comprehensive screening tools to identify these symptoms.

Keywords Disordered eating · Youth · Behavioral health screen · Primary care

Eating disorders represent a serious public health issue affecting patients, families, and the health care community. Sufferers are prone to increased psychological distress and co-occurring physiological problems as a result of their illness.[1] Amongst those with eating disorders, almost half endorse depressive symptoms and suicide rates are 23 times that of the general population (Harris & Barraclough, 1997). Recent studies have found that almost half of adolescents with eating disorders struggle with depression and suicide.[2, 3] Eating disorders also challenge families and relationships. Socially, stress on the family is a well-documented issue.[4, 5, 6] Indeed, those with eating disorders report more conflicts in family functioning when compared with healthy controls.[7] Eating disorders also pose challenges to the healthcare system. The mean eating disorder costs to the U.S. healthcare system are over $6,000 (Anorexia) per female patient, per year; costs

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[1] See Ref [1].
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for Anorexia alone surpass that of per person treatments for Schizophrenia and obsessive–compulsive disorder.[8]

According to population-based surveys, rates of eating disorders and disordered eating (DE) have increased since the 1990s[9] and often emerge in adolescence.[10] Among those affected by an eating disorder diagnoses, the majority are female.[11] In community samples, 10% of females and 1% of males experience some type of eating disorder in early or middle adolescence.[12] DE and associated mental, familial and physical issues pose a serious threat to the developmental processes associated with adolescent and young adulthood.[13] If not detected early enough, intensive health treatments are required (see Footnote 8), further disrupting healthy socio-developmental milestones. Anorexia, in particular, has proven to be a destructive, deadly disease (see Footnote 15). The early age of onset for eating disorders is particularly troubling given that anorexia has one of the highest mortality rates of any psychiatric disorder due to starvation and suicide.[14, 15, 16]

Risk Factors for Disordered Eating

Research suggests DE symptoms are better understood in the context of a broader set of psychosocial factors.[17] Two domains have been particularly associated with DE risk.[18] These domains include internalizing symptoms (e.g. anxiety, depression)[19] and social stressors (e.g. bullying, interpersonal concerns).[20] A meta-analytic review of risk factors for DE revealed that individual factors such as body dissatisfaction, negative affect and perfectionism, impulsivity, substance use, and internalization of the thin-ideal contribute to pathology.[21] Another review demonstrated the impact external factors on DE risk. Cross sectional and longitudinal datasets show that sexual abuse and other adverse life experiences impact DE along with individual factors and psychiatric morbidity (see Footnote 7). Internal and external factors contribute to DE symptoms[22, 23] and awareness can aid in determining eating disorder risk.

Screening in Primary Care

Early detection of DE can reduce risk of mortality, serious health consequences, and the costs incurred by intensive treatments. Unfortunately, DE symptoms can be difficult to identify in fast-paced medical and primary care settings.[24, 25, 26] Research shows that health professionals only identify approximately 10% of patients with binge-eating disorders, 50% of patients with anorexia and subclinical anorexia, and $<10\%$ of patients with bulimia nervosa.[27, 28] Detection of DE symptoms in female patients has continued to be challenging despite the fact that they are the majority of those affected by eating disorders (see Footnote 5). One study interviewed 2064 women, ages 18–25, and compared their self-reported symptoms with physicians' diagnostic reports.[29] Findings showed that physicians only diagnosed 20% of women with EDs despite detecting multiple symptoms, such as menstrual cycle disorders and abnormal weight loss. The medical community recognizes that, without being able to properly detect DE symptoms, patients at risk for eating disorders will often go untreated. Indeed, a significant portion of youth go untreated for DE symptoms. Only 22% of youth with eating disorders or DE behaviors receive treatment from a mental health professional, even though 89% of this population have reported identifiable, co-morbid psychiatric disorders (see Footnote 9). This lack of service utilization contributes to the low numbers of adolescents and young adults receiving early intervention.

One way to identify DE symptoms and increase use of early intervention services is to conduct regular mental health screenings in primary care. The American Association of Pediatrics (AAP) recommends full psychosocial assessments at least once a year at well visits.[30] Models have been created to facilitate the integration of behavioral health and primary care services.[31, 32] Research has demonstrated the value of medical-behavioral primary care for youth

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populations[33] and specific strategies have been developed to address DE in primary care. Implementation of these strategies is particularly important given that individuals with eating disorders are more likely to seek treatment in a medical versus a mental health setting.[34] Awareness of risk factors for eating disorders, screening, and opportunities for collaboration have been identified as critical elements in these integrated care strategies.[35] Screening tools, in particular, are useful in identifying at-risk youth[36] and informing triage decisions.

Current Study

The relationship between individual and social risk factors in DE risk is an area of ongoing development and requires more attention. This is particularly true in the context of primary care where these issues could be identified early. Without knowing the constellation of factors affecting DE risk, providers may only be attuned to eating-related cues when deciding whether or not to screen patients. A greater understanding of the broader risk domains impacting DE behavior can facilitate early identification, inform targeted assessment and increase specificity in triage efforts.

The aim of the current study is to examine a broad array of psychosocial domains to determine the characteristics of female youth most at risk for DE symptoms in primary care. The study uses a brief, web based, and multidimensional assessment tool to identify intrapersonal and environmental characteristics associated with DE symptoms. Data were generated from participant self-reports during routine primary care visits. An advanced statistical strategy, latent class analysis (LCA), was used to identify risk profiles of female adolescents and young adults. These risk profiles can serve to identify those most at risk for DE symptoms.

Methods

Participants

The data were collected as part of a mental health screening program in primary care. Ten primary care sites in rural and semi-rural Pennsylvania administered the behavioral health screen (BHS)[37] tool as part of routine clinical care. Most primary care offices used the BHS as indicated, screening only when there was concern about a youth's behavioral health. Other practices, however, screened patients regardless of presenting concerns. In either case, the medical records data used in this study do not represent all patients in primary care, but a subsample of patients deemed "in need" of a mental health assessment. Individual providers determined which patients would benefit from a screen based on clinical impression and previous experience working with the patient. All participants in our sample identified as female.

Measures

The BHS was designed to screen for behavioral health problems. It is consistent with best practice recommendations from the AAP for psychosocial assessment at well visits (see Footnote 18). The screening tool is hosted and distributed by Medical Decision Logic, Inc. ("mdlogix"), a health informatics software engineering company (see http://www.BH-Works.com). The BHS covers 14 domains: demographics, medical, school, family, safety, substance use, sexual risk, nutrition and eating, anxiety, depression, suicide and self-harm, psychosis, trauma, bullying, and gun access. There are 61 main questions and 46 follow-up questions assessing present, past week and past year experiences. The BHS has demonstrated feasibility for use in primary care and emergency departments (see Footnote 29). Items were developed by 20 national experts and local medical practitioner focus groups.[38] The BHS has also proven to be acceptable to primary care providers (PCPs), parents, adolescents, and young adults.[39, 40] Several studies, testing validity and reliability, as well as item-response theory, have demonstrated that the BHS is psychometrically robust (see Footnote 29). [41] Use of the BHS in an emergency department setting increased percentages of identified behavioral health issues from 2.5 to 10.5% (OR = 4.58, 95% CI 3.53, 5.94) (see Footnote 32). Finally, in a sample of youth in primary care (N = 415), the tool showed good sensitivity and specificity with overall accuracy ranging from 78 to 85% (see Footnote 29).

Disordered Eating Symptom Subscale

Four items comprised the DE symptom subscale: (1) How often do you think that you are fat even though some people say that you are skinny; (2) How often do you try to control your weight by skipping meals; (3) How often do you try to control your weight by making yourself throw up; and (4) How often do you have trouble stopping eating once you've

[33] See Ref [32].
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[41] See Ref [40].

Table 1 DE subscale item reliability and corrected item-total correlations

Disordered eating subscale items	Scale mean if item deleted	Scale variance if item deleted	Corrected item-total correlation	Squared multiple correlation	Cronbach's alpha if item deleted
1) How often do you think that you are fat even though some people say that you are skinny	0.61	0.853	0.509	0.281	0.483
2) How often do you try to control your weight by skipping meals	1.05	1.118	0.548	0.326	0.436
3) How often do you try to control your weight by making yourself throw up	1.30	1.803	0.291	0.114	0.645
4) How do you have trouble stopping eating once you've started	1.05	1.299	0.378	0.143	0.568

started. Responses to these items were coded on a 3-point scale: "never," scored as 0, "sometimes," scored as 1, and "often," scored as 2. Responses were averaged to obtain a total DE score. A transdiagnostic approach to DE is used in the BHS, where the more symptom items endorsed, the greater amount of eating disorder pathology present.[42, 43] The transdiagnostic nature of the measure was reflected in the internal consistency statistic for the DE symptom scale in the sample ($\alpha = 0.59$). The corrected item-total correlations ranged between 0.29 and 0.55 (see Table 1) and are considered adequate, based on Clark and Watson's recommendations for scales tapping into broad dimensions.[44] Scales with fewer items often have lower reliabilities than longer scales. Removal of item three ("How often do you try to control your weight by making yourself throw up") would have raised the Cronbach's alpha slightly; however, this decision would have compromised content validity.

Several scales on the BHS direct participants to respond based on a timeline (e.g. "within the past 2 weeks"). A timeline was not used in the DE scale in order to encourage participants to respond with their current engagement in DE behavior at time of screen. The scale was designed so that, if a patient endorsed risk on the BHS, this initial report would pave the way to follow up on symptom history. The four DE items were derived from the eating attitudes test (EAT) and have, therefore, maintained a similar, present-oriented timeline. The EAT is a 40-item, self-report instrument designed to measure thoughts, attitudes, and symptoms characteristic of eating disorders.[45, 46] The abbreviated, 26-item version (EAT-26) was derived from a factor analysis of the EAT-40, with three main factors: dieting (avoidance of fattening foods and preoccupation with thinness), bulimia and food preoccupation (thoughts about food and bulimia), and oral control (self-control about food and social pressure to gain weight).[47] The EAT-26 has been shown to be a reliable and valid assessment of clinical symptoms associated with anorexia and bulimia nervosa.[48] Original BHS DE scale items demonstrated face validity in a pilot sample (N = 38). In this analysis, BHS item responses were compared to corresponding items on the EAT-26. Correlation statistics for each item

Table 2 Endorsement of risk factors in the overall sample (N = 3620)

	N	%
Risk for anxiety	1638	45.3
Risk for depression	1094	30.2
Risk for suicide	122	3.4
Risk for substance abuse	84	2.3
Risk for traumatic distress	918	25.3
History of abuse	358	9.9
Health problems	432	11.9
Parental criticism	1107	30.6
Family arguing	2676	73.9
Lack of family support	2508	69.3
Exposure to home violence	561	15.5
Exposure to neighborhood violence	963	26.6
History of tobacco use	963	26.6
History of alcohol use	1331	33.6
History of marijuana use	634	17.5
History of other drug use	192	5.3
Spends with friends (vs. alone)	1165	21.3
Victim of verbal bullying	480	8.8
Victim of physical bullying	85	1.6
Victim of cyber bullying	131	2.4

[42] See Ref [41].

[43] See Ref [42].

[44] See Ref [43].

[45] See Ref [44].

[46] See Ref [45].

[47] See Ref [46].

[48] See Ref [47].

Table 3 Fit statistics for LCA models representing one to four groups

Model	BIC	SSA BIC	VLMR	*p*-value	Adj. LMR	*p*-value	Entropy
1 group	60937.29	30870.56	n/a	n/a	n/a	n/a	n/a
2 groups	56138.61	56001.98	30382.61	0.28	4951.49	0.28	0.80
3 groups	54751.88	54545.34	27893.13	0.03	1558.36	0.03	0.84
4 groups	54144.758	53868.315	27109.625	0.08	783.05	0.08	0.83

BIC Bayesian information criterion, *SSA BIC* sample-size-adjusted BIC, *VLMR* Vuong-Lo-Mendell-Rubin likelihood ratio test, *Adj. LMR* adjusted Lo–Mendell–Rubin likelihood ratio test, *n/a* not applicable

ranged from 0.19 to 0.45. Some items could not be validated because there was no variation in responses.

Since this pilot study, several items were adapted in the most recent BHS version in order to increase item comprehension for a youth sample and capture DE symptoms across diagnostic categories. The first item (see Table 1) is intended to determine disturbance in body weight perceptions experienced across eating disorder diagnoses. The second item on the DE subscale is intended to capture restrictive eating behaviors associated with AN and some presentations of BN. The final two items were designed to capture symptoms associated with the binge-purge cycle and overeating behaviors (see Footnote 30).

Procedure

Implementation of the BHS was part of a larger study on healthcare integration. The project provided consultation to ten primary care practices, training for medical staff administering the online version of the tool, and assistance with strengthening referral networks. The screen was administered in the waiting or exam room via a laptop or electronic tablet. Although parents were often provided a brief description of the tool, youth were given privacy while completing the BHS. This is standard practice in adolescent primary care. In Pennsylvania, state law permits youth, 14 years and older, to seek mental health resources without parental consent, to include this low-risk screening research leading to a potential referral.

The BHS begins with a brief explanation of the tool and an Institutional Review Board-approved consent form explaining how de-identified information is used for research. Ninety percent of screened patients consented to participate in this study. The BHS took patients an average of 7–10 min to complete. Upon completion, the BHS instantly generated a report and was reviewed by the PCP prior to the youth's appointment. Results were then incorporated into the patient's medical chart and used to inform clinical recommendations.

Data Analytic Plan

This study examines a psychosocial domains to determine the characteristics of female youth most at risk for DE symptoms in primary care. First, we applied LCA using Mplus Version 6.0[49] to 20 risk factors endorsed on the BHS. This was to determine whether relationships among the factors identified distinct profiles of patients. The items included mental health symptoms, familial issues, exposure to violence, drug use, and other socio-environmental factors (see Table 2). Models with increasing numbers of groups were fitted to the data until comparative fit statistics suggested that the estimated model did not provide statistically significant improvement in fit over a model with one less group.[50] The Bayesian information criterion (BIC) and the sample-size-adjusted BIC were used to estimate model fit; lower numbers represent better-fitting models. The Vuong–Lo–Mendell–Rubin likelihood ratio test and the adjusted Lo–Mendell–Rubin likelihood ratio test were used to compare models. The entropy measure was used to indicate how well the models classified individuals into groups; values of entropy range from 0 to 1, with values closer to 1 suggesting better classification of individuals to groups. Finally, analyses of covariance (ANCOVA) examined differences in DE across the groups, controlling for associated demographic variables (e.g., age dummy coded $1 \geq 18$, race dummy coded 1 = White, ethnicity dummy coded 1 = Hispanic).

Results

A total of 3620 female patients completed the BHS during the recruitment period. Participants ranged from 14 to 24 years old ($M = 16.94$, $SD = 2.69$) and the majority (65.6%) of the sample self-identified as white. Table 2 shows endorsement of the 20 risk factors for the entire sample.

[49] See Ref [48].

[50] See Ref [49].

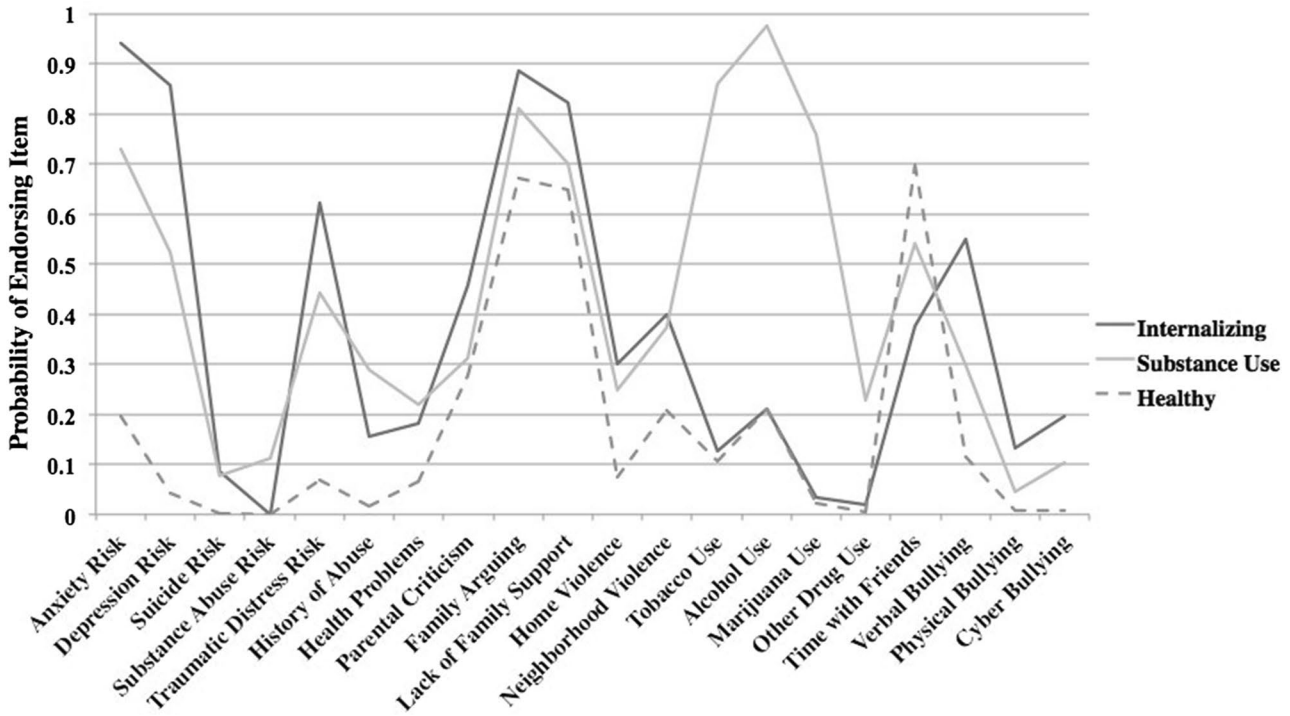

Fig. 1 Probability of endorsing each risk indicator across the three latent classes

Latent Class Analysis

Fit statistics for models in which one–four groups were fitted to the data are displayed in Table 3. Although the four-group model had a lower BIC and a lower Adjusted BIC than the three group model, both likelihood ratio tests supported a three group mode; *p* values indicated that the four group model did not fit the data better than the three group model. The three groups varied in their endorsement of the 20 risk factors. Figure 1 charts distinctive group patterns and the probability of participant groups' endorsement on multiple psychosocial risk factors. One group, labeled the substance use group (N = 745), had the highest probability of endorsing substance use ($p < .05$). The second group, labeled the internalizing group (N = 711), had the highest probability of endorsing anxiety, depression, and traumatic stress ($p < .05$). The third group, labeled the healthy group (N = 2163), had lowest probability of endorsing mental health problems, including trauma and substance use ($p < .05$). Participants in the three groups showed significant differences on each of the 20 risk factors, including internalizing symptoms (e.g., depression, anxiety, traumatic distress) and substance use. Participants in the three groups also differed in age (X^2 (2) = 90.22, $p < .001$), racial minority status (X^2 (2) = 385.29, $p < .001$), and Hispanic ethnicity (X^2 (2) = 93.90, $p < .001$). Thus, these demographic variables were included as control variables in subsequent analyses.

Group Differences in Mean Disordered Eating Symptoms

An ANCOVA examined group differences across DE symptoms, controlling for age, race, and ethnicity. The three groups differed significantly on DE symptoms, F (2, 3498) = 269.38, $p < .001$. Post-hoc comparisons using Tukey's HSD revealed that mean DE scores were significantly different across all three groups (all $ps < 0.05$). Mean scores on the DE scale were highest in the internalizing group ($M = 1.14$, $SD = 0.86$), followed by the substance use group ($M = 0.98$, $SD = 0.90$), and lowest in the healthy group ($M = 0.49$, $SD = 0.57$).

Discussion

The aim of this study was to examine characteristics of female youth most likely to endorse DE symptoms in primary care. An LCA was used to identify DE risk profiles. Twenty risk factors, including behaviors, socio-environmental factors, experiences and events, were measured using the BHS, a brief and multidimensional screening tool. These

risk factors generally fell into the following categories: history of abuse/trauma, individual psychopathology (e.g. anxiety, suicidality, substance use), physical health, school impairment, social/family concerns (e.g. bullying, time spent alone, parental criticism), and exposure to violence. The LCA allowed for a data driven approach to grouping adolescents based on their responses to the 20 risk factors. Findings distinguished three groups, reporting variations in DE risk. Figure 1 charts each group's endorsement of the 20 psychosocial factors examined. The group reporting the most DE symptoms, labeled the internalizing group, was characterized by high probability of endorsing symptoms of anxiety, traumatic distress, and depression. This group also had a low probability of endorsing externalizing concerns (e.g. substance abuse). The group at the next highest risk for endorsing DE symptoms was labeled the substance use group due to their high probability of endorsing marijuana, tobacco, alcohol, or other drug use. Interestingly, adolescents in this group were at high risk for substance *abuse*; however, they were distinguishable from other groups only by their frequency of substance *use*. Finally, the last group, the healthy group, was least likely to endorse any of the mental health risk factors, including DE symptoms.

The internalizing, substance use, and healthy groups all differed on level of reported DE risk, even after controlling for associated demographic variables. The internalizing group endorsed the most DE symptoms compared to the other two groups. This suggests that the risk for DE may be more closely associated with internal, rather than external, phenomena. Indeed, past research demonstrates that those with comorbid psychopathology, negative affect, thin ideal internalization, and body dissatisfaction may be more at risk for DE. [51, 52, 53] than those with the externalizing issues examined in this study. Indeed, the substance *use* group endorsed DE symptoms to a lesser degree than the internalizing group. These findings pose interesting questions about the role of substances in global mental health functioning. Past research has associated substance *abuse* with DE,[54] yet more research is needed to determine how substance *use* differentially affects ED risk. One explanation for why substance using adolescents were at lesser risk for DE symptom endorsement than the internalizing group might be related to experiences of negative affect. Negative affect or difficulty regulating emotions is a central component to theoretical and etiological models of eating and internalizing disorders.[55] As aforementioned, these adolescents in the substance use group gravitated to more externalizing manifestations of psychopathology (smoking, drug use, etc.), possibly making them less likely to experience higher amounts of negative affect. Finally, the healthy group was the least at risk for endorsing DE symptoms. This group primarily differed from the other two by its absence of trauma as well as internalizing and externalizing concerns. Additionally, these youth were more likely to report spending time with friends rather than being alone. With characteristics such as these, it is not surprising that the third group showed the lowest risk for endorsing DE symptoms.

A key characteristic of the group at highest risk for ED symptom endorsement (internalizing group) was the substantial amount of reported traumatic distress compared to the substance use and healthy groups. Not surprisingly, trauma has been consistently linked to the development and perpetuation of DE in adolescents and young adults.[56, 57] Multiple studies have illustrated the prevalence of traumatic events (e.g. childhood trauma, sexual abuse) amongst people suffering from DE and eating disorders.[58, 59, 60] For example, Madowitz et al. [55] examined the etiological links between sexual assault and DE, finding that sexual trauma preceded the onset of eating disorders. In the present study, it is unclear whether history of trauma increases a patient's likelihood of experiencing internalizing symptoms. Our findings, however, demonstrate that the combination of internalizing symptoms and traumatic distress places youth at greater risk for DE endorsement than other risk profiles.

Limitations

The BHS is a brief screening tool and not meant to provide full diagnostic information about mental health. The purpose of the screen is to alert health professionals to potential risk and promote further assessment and triage efforts. The brevity and nature of DE symptom scale increases its utility for efficient screening in a fast-paced environment, but poses some limitations to this research. First, the use of a mean score on the DE scale assumes a transdiagnostic approach to DE symptomology. In other words, more items endorsed indicate greater risk for eating disorders. Counter arguments to this transdiagnostic framework would emphasize that each item represents a unique element of eating disorder pathology and is not cumulative. This means the scale does not allow for an analysis of severity or frequency within each diagnostic category. The nature of the scale could limit our

[51] See Ref [22].
[52] See Ref [50].
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[56] See Ref [53].
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[59] See Ref [56].
[60] See Ref [57].

understanding of varying levels of risk among participants endorsing DE items. Second, weight and BMI data was not reported by PCPs administering the BHS in this study; therefore, actual underweight or overweight status could not be used to infer further diagnostic information about these patient participants. This study utilized data from a brief screening tool in primary care settings. This self-report screen does not require youth to report their weight. In the future, it would be helpful to include provider reports of weight as part of the youth screen profile. Finally, the type (e.g. laxatives, vomiting, over exercise) or amount (e.g. how often binge and purges occurred) of symptoms was not captured in these screening questions. These subscale limitations are not uncommon in multi-faceted, comprehensive BHSs. Measure developers must capture complex symptom presentations in four or five items. It is a challenging task to balance the needs of providers in fast-paced environments with the best screening practices for youth. Future research should seek to refine and hone these items in order to best capture DE risk in the briefest way possible.

Several other limitations should be considered. Data for this study came from indicated screening practices. Screenings were subject to providers' discernment and, therefore, the data do not represent an epidemiological sample of primary care patients. Each site and provider operated under an individualized set of criteria informing screening practices. Understanding PCPs' decision-making on DE screening is an important area of further exploration. In this study, the BHS DE scale produced an internal consistency of 0.59. Although it is expected that brief scales, capturing a broad array of symptom may have lower internal consistencies than full measures, it is important to consider the factors impacting this result. This may be due to the transdiagnostic nature of the measure. In a single DE scale, the BHS addresses restrictive, binging and purging behaviors along with body-specific perception bias. Each of these items may individually represent risk for specific ED subtypes. It is possible that the DE scale is less valuable to primary care clinicians than viewing each item independently. In other words, endorsement of one of these items may warrant follow-up procedures according to DE subtype.

Some items on the DE scale could not be validated because there was no variation in responses. In addition, several items were adapted in the most recent version of the BHS to capture symptoms across ED diagnosis. This adpated form of the BHS (see measures section) lacks information on scale validation. Future studies should examine the predictive power of the BHS by following patients' diagnostic outcomes after screen. Such inquires would further bolster the validity of the BHS as a DE screening tool. Finally, the sample was largely taken from primary care practices in rural and semi-rural communities in the northeastern part of the United States. Replication of the analyses with data from other geographical locations is needed to generalize findings to other populations. Despite these limitations, the current study identified several risk profiles associated with DE symptoms among young females. Further, findings highlight the relative risk for eating disorder pathology associated with internalizing problems and traumatic distress.

Clinical Implications

The AAP recommends a complete psychosocial assessment at a yearly well visit (see Footnote 18). Still, busy PCPs might not have time to do a thorough initial evaluation. Psychiatry has an increasing role in primary care settings[61] and integrative teams work with PCPs in identifying, referring and treating patients. The adoption of multidimensional behavioral health assessment tools might improve PCP's ability to gather essential psychosocial information before referring the patient to psychiatry. Comprehensive tools, like the BHS, not only inquire about DE symptoms, but also gather indicators of traumatic distress, abuse, co-morbid mental health concerns and externalizing problems. Findings this study demonstrate that these psychosocial factors may provide additional information about DE risk.

The Role of Primary Care Providers

Using comprehensive screening tools can help provider teams be more efficient in identifying DE. Currently, depression screens are the usual practice to screen for mental health in primary care settings.[62] These screens, however, may not adequately identify all the youth who are at risk for internalizing issues nor evaluate all risk factors impacting them.[63, 64] The BHS offers a strategy for assessing a wide range of behavior and also allows psychiatrists at local and remote sites to access to the results from a generated link. In other words, the BHS facilitates collaboration between providers by use of a central monitoring system. Providers across departments can share screening information quickly to prepare for further assessment and triage. Strategies for preventing and treating DE in integrated settings depend on open communication and collaboration between providers (see Footnotes 12 and 22). Tools like the BHS provide an efficient way to exchange critical information in these fast-paced environments.

BHS results do not provide a diagnostic information; however, results do capture enough information to start a conversation about DE risk. The BHS serves as the starting

[61] See Ref [58].
[62] See Ref [59].
[63] See Ref [60].
[64] See Ref [61].

point to initiate more comprehensive assessments in primary care settings. For example, BMI is an important measure to assist providers in differential diagnosis of EDs, but is often inaccurately reported on self-report measures. A clinical score on the BHS could support the collection of BMI data and facilitate discussion between provider and patient. Given that DE symptoms are likely to remain unassessed, the BHS could prove a valuable tool for the PCPs and psychiatry.

The risk profiles identified in this study might also serve to broaden PCP's perceptions on youth at risk for DE; therefore, increasing informed use of indicated screening practices. Endorsement of trauma and use of substances among female youth may serve as an indicator for further DE follow-up beyond the brief format of the screening tool. Eating disorders are secretive disorders and youth may not always be forthcoming about their eating behaviors in self-report instruments.[65, 66] The risk profiles provide a way to identify potential risk even when youth have difficulties reporting their symptoms to PCPs. Endorsement of items indicated in these risk profiles could also cue PCPs to follow up with objective measures, such as BMI. Moving beyond assessment, the symptom constellations can provide opportunities for primary care sites to prepare for appropriate referrals. Depending on patient profile, PCPs and psychiatrists might recommend services that can address DE along with the other factors contributing to the distress (e.g. history of trauma, substance use).

Summary

DE symptoms present serious concerns for patients, families and their providers. Unfortunately, DE symptoms can be difficult to detect in fast-paced medical settings. Using a brief mental health screening tool, this study identified DE risk profiles in a primary care sample of female adolescents and young adults (ages 14–24). Results from an LCA revealed three groups varying in their reported levels of DE risk. The group at highest risk for endorsing DE symptoms (the internalizing group) also had the highest probability of reporting anxiety, traumatic distress, and depression as well as low probability of endorsing substance abuse. This group reported a substantial amount of traumatic distress relative to the others. The group next at risk (the substance use group) consisted of those youth with externalizing symptoms (i.e. use of tobacco, alcohol and marijuana). The reduced risk for DE symptoms in this group might be explained by youths' tendency to have more externalizing manifestations of psychopathology (smoking, drug use, etc.); behaviors that possibly lessen the amount of negative affect typically experienced by youth endorsing DE. Finally, the healthy group was distinguishable only by reported time spent with friends. This study is not without limitations. Although the DE measure was feasible for fast-paced PCPs, it did not provide comprehensive information about eating disorder symptomology. Replication of these analyses are needed in diverse geographical locations and without the constraints of selective screening practices. Despite these limitations, multidimensional behavioral health assessment tools can help PCPs and psychiatry teams identify DE early. Although brief screeners cannot be used as diagnostic assessments, these measures can provide information on a wide range of psychosocial factors related to DE. Consistent use of these tools can initiate important conversations between providers and patients.

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Compliance with Ethical Standards

Conflict of interest Dr. Guy Diamond will receive some minor royalty payments if and when the Behavioral Health Screen (BHS), which was used to collect the data, is marketed to the public. None of the other authors have any conflicts of interests to disclose. All authors will receive academic credit should this manuscript be published.

Ethical Approval The Institutional Review Board at Drexel University approved the study procedures and participants were treated in accordance with APA ethical standards.

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