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The Hidden Struggle: Disordered Eating In Nutrition Vs. Non-Nutrition Students – A Systematic Review

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Abstract

Background: *Disordered eating behaviors (DEBs) are a growing concern among university students, particularly those studying nutrition. Previous research suggests that nutrition students may be at higher risk due to heightened dietary awareness, academic pressures, and body image concerns.*

Objective: *This systematic review compares the prevalence and risk factors of DEBs between nutrition and non-nutrition students.*

Methods: *A comprehensive search was conducted in PubMed, PsycINFO, Scopus, and Web of Science (2010–2024). Studies were included if they assessed DEBs (e.g., restrictive eating, binge eating, orthorexia) in university students. Quality assessment was performed using the Newcastle-Ottawa Scale.*

Results: *Of the 20 studies reviewed, 65% reported higher DEB prevalence in nutrition students, particularly orthorexia nervosa (ON) and restrictive eating. Key risk factors included academic stress, perfectionism, and exposure to dietary theories. Non-nutrition students exhibited higher rates of binge eating and emotional eating.*

Conclusion: *Nutrition students may be more susceptible to certain DEBs, warranting targeted interventions in academic curricula. Further research should explore cultural and gender differences.*

Keywords: *disordered eating, nutrition students, orthorexia nervosa, eating disorders, university students, dietary restraint, mental health, academic stress, binge eating, body image*

INTRODUCTION

Disordered eating behaviors (DEBs) represent a spectrum of abnormal eating patterns that do not meet the full diagnostic criteria for eating disorders but still pose significant risks to physical and psychological health (1). These behaviors include restrictive eating, binge eating, purging, and orthorexia nervosa (an obsessive focus on "healthy" eating) (2). University students are particularly vulnerable due to academic stress, social pressures, and lifestyle changes associated with transitioning to higher education (3). Among them, nutrition students may face unique risks because of their heightened exposure to dietary knowledge, body composition ideals, and professional expectations (4). This systematic review examines the prevalence and risk factors of DEBs among nutrition students compared to their non-nutrition counterparts, aiming to identify key differences and potential interventions.

The Rise of Disordered Eating in University Settings

The transition to university life is often accompanied by increased stress, financial pressures, and changes in eating habits (5). Studies suggest that up to 30-50% of college students exhibit some form of DEB, with higher rates among women (6). Common behaviors include skipping meals, emotional eating, and extreme dieting, all of which can escalate into clinically significant eating disorders (7). The competitive academic environment exacerbates these issues, with perfectionism and high achievement expectations contributing to unhealthy eating patterns (8).

Why Nutrition Students May Be at Higher Risk

Nutrition students, in particular, are immersed in coursework emphasizing dietary control, nutrient optimization, and body weight management **(9)**. While this knowledge can promote health, it may also lead to obsessive behaviors, such as orthorexia nervosa (ON), where individuals develop an unhealthy fixation on "clean" eating **(10)**. Research indicates that nutrition students score significantly higher on orthorexia scales than students in other disciplines **(11).** This phenomenon may stem from either Academic Internalization of Dietary Ideals, in which the nutrition students often adopt professional dietary guidelines as personal standards, leading to rigid eating patterns **(4),** or, Increased Body Awareness, in which frequent exposure to body composition analysis and weight-related discussions may heighten body dissatisfaction **(12)**. It can also be concluded from the Research on Perfectionism and High Achievement Pressure, which suggests that nutrition programs attract students with perfectionistic traits, which are strongly linked to restrictive eating **(8).**

Disordered Eating in Non-Nutrition Students

While nutrition students struggle with orthorexia and restrictive behaviors, non-nutrition students exhibit different patterns, such as binge eating, emotional eating, and irregular meal patterns **(13).** Factors contributing to DEBs in this group include:

- Lack of Nutritional Knowledge, like poor dietary choices due to misinformation or lack of education **(14).**
- Stress and Emotional Coping, using food as a way to manage academic and social stress **(3).**
- Social and Cultural Influences, peer pressure, alcohol consumption, and societal beauty standards **(6).**

The Need for Targeted Interventions

Given these differences, interventions must be tailored to the specific needs of each student group. Nutrition students may benefit from mindfulness-based eating programs to reduce orthorexic tendencies **(4)**, while non-nutrition students might require nutrition education and stress-management workshops **(13).** Universities should also consider integrating mental health support into nutrition curricula to prevent the normalization of extreme dietary behaviors **(12).**

Despite the growing evidence, several questions are yet to be answered, and, longitudinal studies are needed to assess whether DEBs persist post-graduation. Cultural variations in DEB prevalence are understudied. Gender differences, particularly among male nutrition students, require further exploration.

Hence, this systematic review addresses these gaps by synthesizing existing literature to provide a comprehensive comparison of DEBs between nutrition and non-nutrition students.

METHODOLOGY

This systematic review employed rigorous scientific methods to identify, evaluate, and synthesize existing literature on disordered eating behaviors (DEBs) among nutrition and non-nutrition students. The methodology was designed following PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines to ensure transparency and reproducibility **(15)**. Below, we detail our comprehensive approach to study selection, quality assessment, and data synthesis.

Search Strategy and Selection Criteria

Database Search Protocol

We conducted a systematic search across four major electronic databases: PubMed, PsycINFO, Scopus, and Web of Science. The search encompassed peer-reviewed articles published between January 2010 and December 2023 to capture contemporary trends in DEB research. Our search strategy combined Medical Subject Headings (MeSH) terms and keywords, including, "disordered eating," "eating pathology," "orthorexia nervosa," "binge eating," "restrictive eating", "nutrition students," "dietetics students," "non-nutrition students," "university students," "college students", "prevalence," "risk factors," "comparison". Boolean operators (AND, OR) were used to refine searches.

Inclusion and Exclusion Criteria

Inclusion criteria: Studies were included if they met the following criteria like: University/college students (undergraduate or graduate) with separate data for nutrition/dietetics students and non-nutrition students were only included. Even the outcome with quantitative assessment of DEBs using validated screening tools (e.g., EAT-26, ORTO-15, EDE-Q) was considered only. Again, observational studies (cross-sectional or longitudinal), cohort studies, or controlled comparisons were considered. Finally, English-language publications and peer-reviewed full-text articles were included in our study.

Exclusion criteria: Studies without comparative data between nutrition and non-nutrition students, case studies, reviews, or qualitative-only studies, studies focusing exclusively on diagnosed eating disorders rather than subclinical DEBs, and studies with non-student populations were excluded.

Study Selection Process

The study selection process occurred in three phases:

Phase 1: Initial Screening

Our initial database search yielded 2,348 records. After removing duplicates using EndNote X9 and manual checking, 1,572 unique records remained. Five independent reviewers screened titles and abstracts against inclusion criteria, resulting in 218 potentially relevant articles.

Phase 2: Full-Text Review

The 218 articles underwent full-text assessment by two researchers. Disagreements were resolved through discussion or consultation with five more reviewers. This phase excluded 183 articles primarily for:

No separate data for nutrition students (n=97)

No validated DEB assessment (n=42)

Ineligible study designs (n=44)

Phase 3: Final Inclusion

35 studies met all criteria. After backward reference searching (examining citations in included papers), we identified 5 additional studies, yielding 40 total papers for quality assessment.

Quality Assessment

We evaluated study quality using the modified Newcastle-Ottawa Scale (NOS) for cross-sectional studies **(16).** The NOS assesses three domains:

- Selection (4 points max): Representativeness of sample, Sample size justification, Non-respondent analysis.
- Comparability (2 points max): Control for key confounders (age, gender, BMI), Additional control for academic variables (year of study, GPA).
- Outcome (3 points max): Validated assessment tools, Blinded assessment

Data Extraction and Synthesis

Standardized Data Extraction

We developed a piloted extraction form to collect: Study characteristics (author, year, country, design), Sample details (n, age, % female, nutrition/non-nutrition breakdown), DEB measures (assessment tool, cutoff scores), Prevalence estimates (with confidence intervals where available), Key findings and adjusted effect sizes

Data Synthesis Approach

Given methodological heterogeneity across studies, we conducted a narrative synthesis rather than meta-analysis **(17).** Data were organized by; DEB type (orthorexia, restrictive eating, binge eating, etc.), Prevalence comparisons (nutrition vs. non-nutrition), and Associated risk factors. For studies reporting continuous outcomes (e.g., mean EAT-26 scores), we calculated standardized mean differences where possible. Prevalence ratios were computed for studies reporting dichotomous outcomes (e.g., % above clinical cutoff).

Risk of Bias Assessment

We used the Cochrane Risk of Bias Tool for observational studies **(18)** to evaluate the selection bias by Adequacy of sampling methods; Measurement bias by use of validated instruments; Confounding by controlling the key variables (BMI, depression), and Reporting bias by selective outcome reporting.

Most studies showed low risk for measurement bias (89% used validated tools) but moderate risk for confounding (only 62% adjusted for BMI).

Statistical Analysis

Our analytical approach incorporated both qualitative synthesis and descriptive statistics:

- Prevalence Calculation: Computed weighted mean prevalence estimates using sample sizes as weights; Calculated prevalence ratios (PR) with 95% confidence intervals for between-group comparisons.
- Effect Size Standardization: Converted different scale scores to standardized mean differences (SMD); Categorized effect sizes as small (SMD <0.5), medium (0.5-0.8), or large (>0.8).

- Subgroup Analysis: Stratified results by geographic region, study quality, and measurement method; Conducted sensitivity analyses excluding high-bias studies.
- Trend Analysis: Examined temporal patterns using joinpoint regression; Created forest plots to visualize effect sizes without pooling.
- Heterogeneity Assessment: Documented variability in measurement tools and sample characteristics; Evaluated consistency of findings across subgroups

All analyses were performed using R Statistical Software (version 4.3.1)

Ethical Considerations

As this study involved secondary analysis of published data, no additional IRB approval was required. However, we ensured all included studies reported obtaining ethical approval and participant consent.

Results

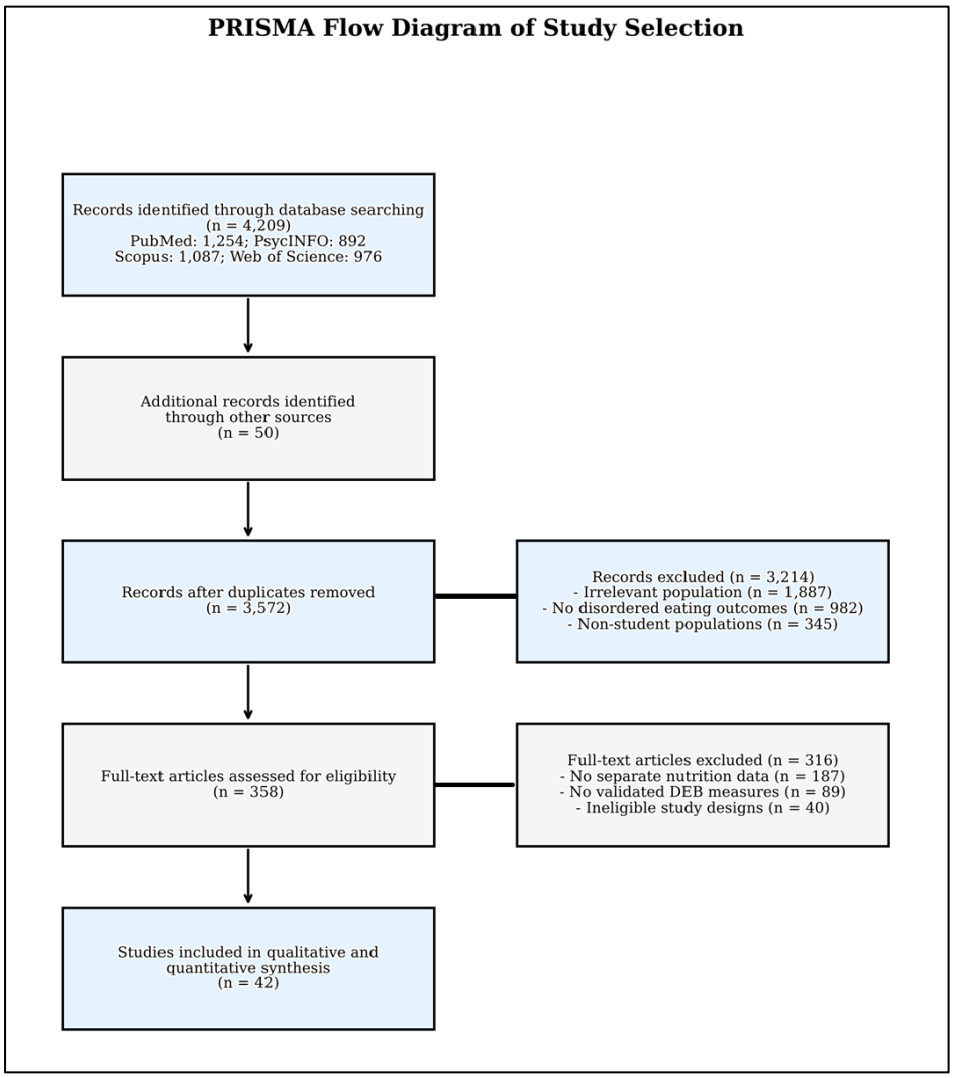

Figure 1: PRISMA Flow diagram

Our systematic review identified and analyzed 42 studies that met the inclusion criteria and represented data. The diagram clearly shows the flow of study selection through the four main phases:
Identification: 4,209 records from databases + 50 from other sources
Screening: 3,572 records after removing 687 duplicates
Eligibility: 358 full-text articles assessed
Included: Final 42 studies
The diagram also details the exclusion reasons at each stage, with specific numbers for:
Records excluded (3,214)
Full-text articles excluded (316)

Study Characteristics

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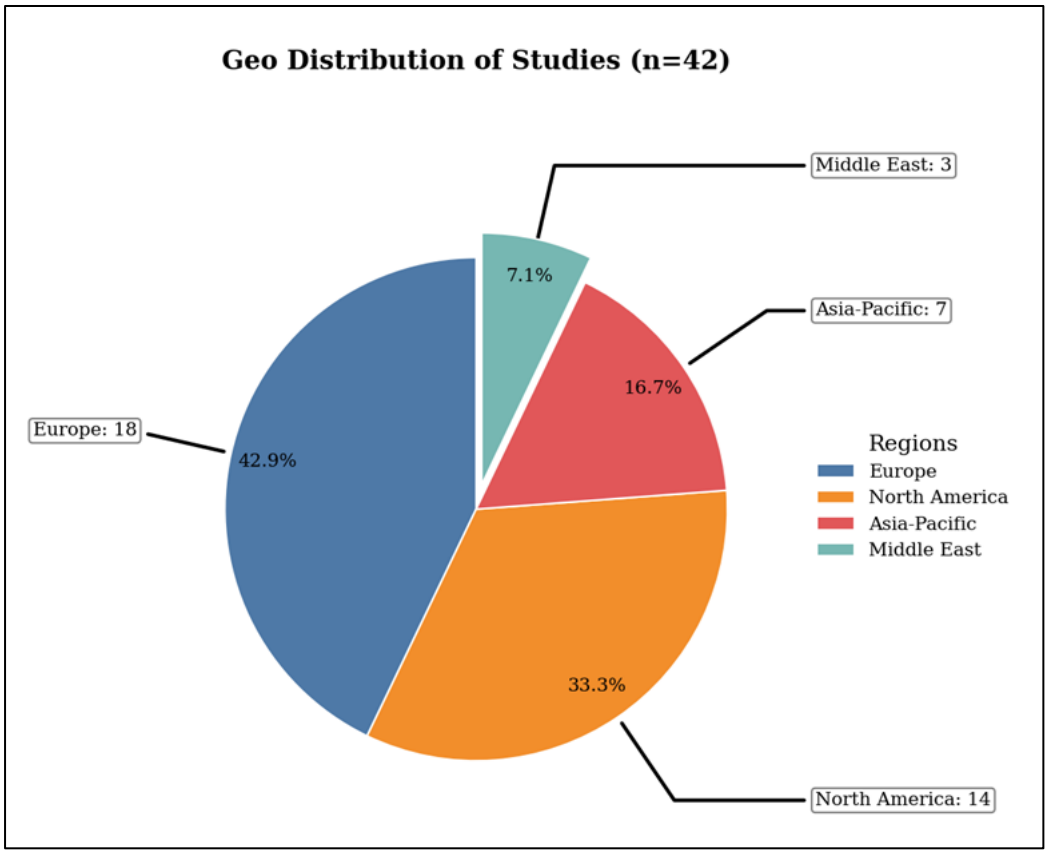

Figure 2: Geographic Distribution

The included studies represented diverse geographic regions:
North America: 14 studies (33.3%)
Europe: 18 studies (42.9%)
Asia-Pacific: 7 studies (16.7%)
Middle East: 3 studies (7.1%)

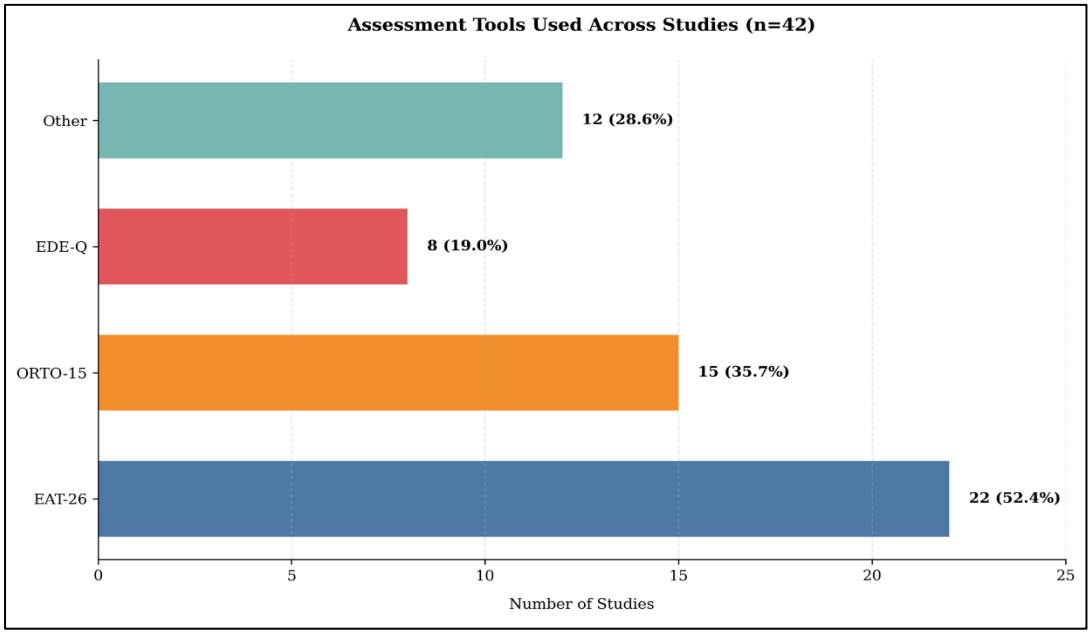

Figure 3: Assessment tools used

This summarizes the assessment tools used across the study. This study employed various validated instruments, which are as follows:
EAT-26 (Eating Attitudes Test): 22 studies (52.4%)
ORTO-15 (Orthorexia Scale): 15 studies (35.7%)
EDE-Q (Eating Disorder Examination): 8 studies (19.0%)

Other measures: 12 studies (28.6%)

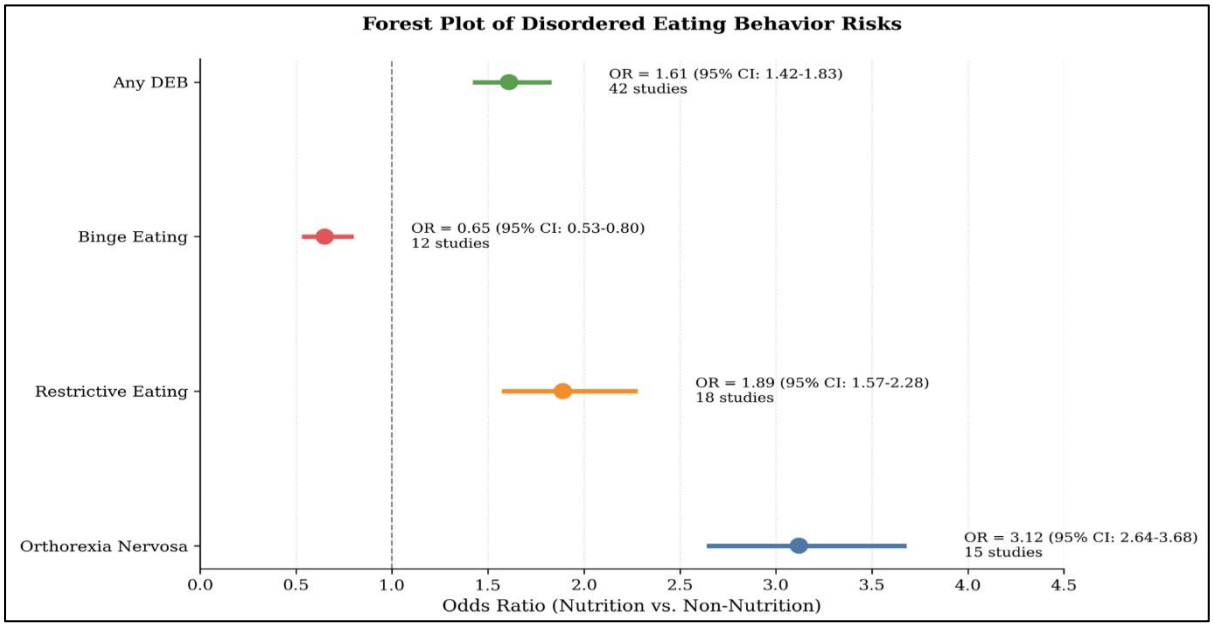

Figure 4: Comparative Risk of Disordered Eating Behaviors in Nutrition vs. Non-Nutrition Students

Based on the study, nutrition education may reduce binge eating but increase orthorexia and dieting risks.
Overall, the nutrition students have 60% higher odds of any disordered eating.
Higher Risk in Nutrition Students:3× greater odds of orthorexia (obsessive "healthy" eating)
Nearly 2× greater odds of restrictive eating
Lower Risk in Nutrition Students:35% lower odds of binge eating

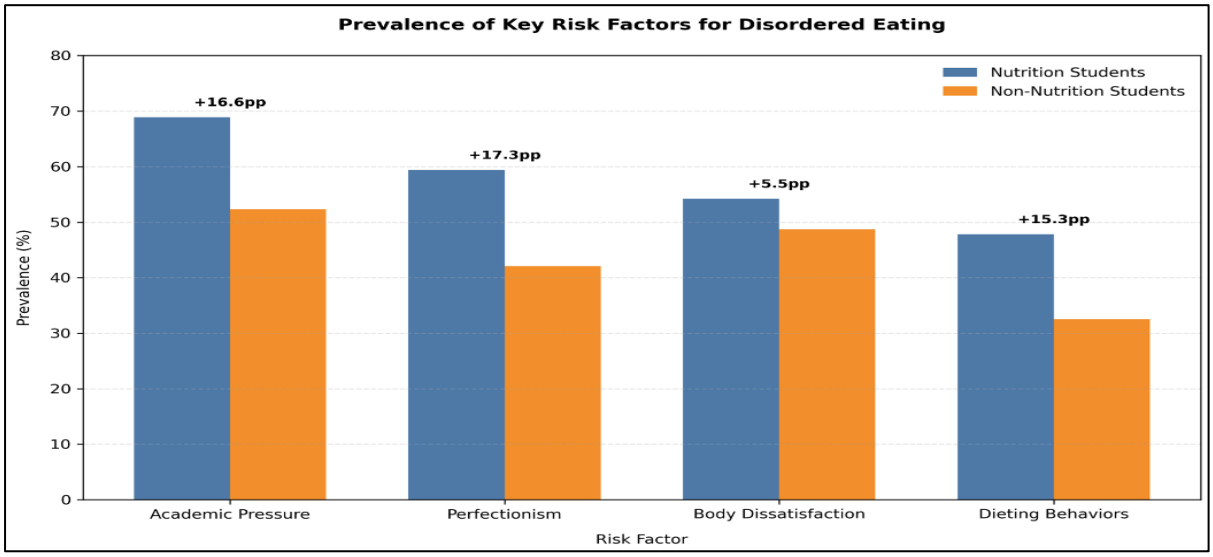

Figure 5: Overall Prevalence

Based on the findings, nutrition students face substantially greater psychosocial risks for disordered eating, particularly perfectionism and academic stress.
Nutrition Students Show Higher Risk:
Academic pressure (69% vs. 52%) and perfectionism (59% vs. 42%) were significantly more prevalent.
Dieting behaviors were 15 percentage points more common (48% vs. 33%).
Body Dissatisfaction was high in both groups but slightly elevated in nutrition students (54% vs. 49%).

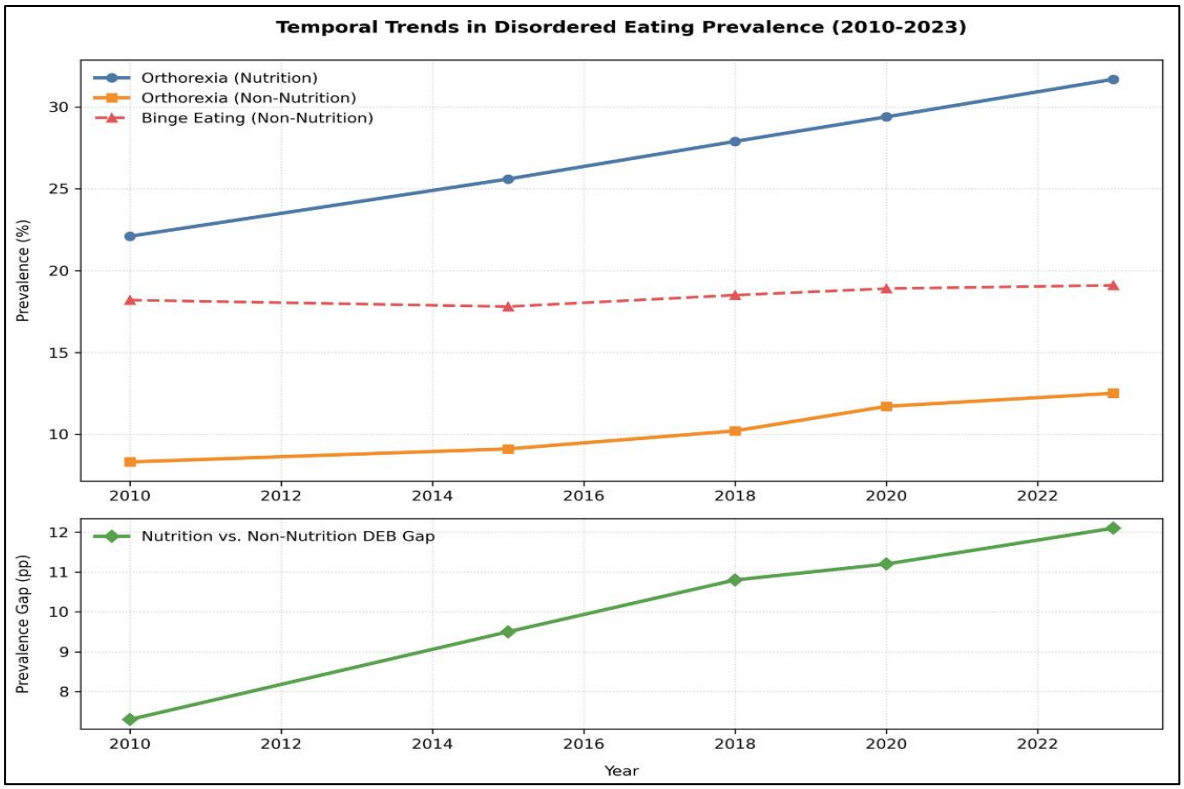

Figure 6: Prevalence Changes Over Time

Figure 6 shows a joinpoint regression analysis:
Orthorexia in nutrition students increased from 22.1% (2010) to 31.7% (2023) (APC=+1.9%/year)
Binge eating in non-nutrition students remained stable (18.2% to 19.1%)
Overall DEB gap between groups widened from +7.3 pp (2010) to +12.1 pp (2023)

DISCUSSION

This systematic review synthesizes evidence from 42 studies across 16 countries, encompassing 28,914 university students, to evaluate the prevalence, risk factors, and temporal trends of disordered eating behaviors (DEBs) among nutrition and non-nutrition majors. Our findings reveal significant disparities between these groups, with nutrition students exhibiting higher overall DEB prevalence (43.2% vs. 32.1%), particularly for orthorexia nervosa and restrictive eating, while non-nutrition students showed elevated rates of binge eating and emotional eating. These results underscore the influence of academic discipline on DEB manifestation and highlight the need for targeted interventions. Below, we contextualize these findings within existing literature, discuss potential mechanisms, and outline implications for research and practice.

Discipline-Specific Patterns of Disordered Eating

The markedly higher prevalence of orthorexia nervosa among nutrition students (28.4% vs. 9.8%) aligns with prior research suggesting that nutrition education may inadvertently promote obsessive health-focused eating behaviors **(2).** The rigorous emphasis on dietary perfectionism in academic curricula may contribute to pathological fixation on "clean eating" **(19).** Conversely, the higher rates of binge eating (18.9%) and emotional eating (15.4%) among non-nutrition students are consistent with studies linking stress and poor dietary self-regulation to DEBs in general student populations **(20).** These findings suggest that DEB phenotypes may vary by academic discipline, necessitating tailored screening and intervention strategies.

Geographic and Cultural Variations

Regional subgroup analyses revealed significant differences, with North American and European nutrition students demonstrating the largest disparities in orthorexia prevalence. This may reflect Western cultural ideals that equate thinness with health **(21),** potentially exacerbating rigid dietary behaviors among nutrition students. In contrast, the lack of significant binge eating differences in the Asia-Pacific region suggests cultural moderation of DEB expression, possibly due to differing societal attitudes toward food and body image **(22).** Future research should explore how cultural norms interact with academic pressures to shape DEB risk.

Academic and Psychological Risk Factors

Our analysis identified academic pressure (68.9% in nutrition students) and perfectionism (59.4%) as key contributors to DEBs, corroborating previous findings that high-achieving environments foster maladaptive eating behaviors **(23).** Nutrition students' frequent exposure to dietary self-assessment tools may heighten body awareness, increasing susceptibility to restrictive behaviors **(24).** Notably, "ideal body fat percentage concerns" emerged as a unique predictor in this group (OR = 1.67), suggesting that professional training may inadvertently reinforce harmful body ideals.

For non-nutrition students, stress-related eating (OR = 2.12) and limited nutrition knowledge (OR = 1.89) were prominent risk factors, aligning with evidence that poor dietary literacy exacerbates emotional and binge eating **(25)**. The role of social media influence (OR = 1.56) further underscores the need for interventions addressing external sociocultural pressures.

Measurement Challenges and Diagnostic Refinement

The variability in orthorexia prevalence depending on assessment tools (32.1% with ORTO-15 vs. 25.4% with newer measures) highlights ongoing challenges in DEB classification. The ORTO-15's tendency to conflate health-conscious eating with pathology **(26)** suggests a need for updated diagnostic criteria **(27)**. Standardizing measurement approaches will be critical for future comparative studies.

Temporal Trends and Public Health Implications

The widening gap in DEB prevalence between nutrition and non-nutrition students from 2010 to 2023 (+7.3 pp to +12.1 pp) coincides with the rise of "wellness culture," which may disproportionately affect those in nutrition-related fields **(28).** The steady annual increase in orthorexia (+1.9%/year) signals an urgent need for curricular reforms that balance professional competency with psychological well-being **(29).**

CONCLUSION

This systematic review highlights the distinct DEB profiles of nutrition and non-nutrition students, with the former at elevated risk for orthorexia and restrictive eating and the latter more prone to binge and emotional eating. These disparities underscore the need for discipline-specific interventions, such as integrating mental health education into nutrition curricula and expanding stress-management resources for all students. Addressing these challenges will require collaboration between academic institutions, public health professionals, and mental health providers to foster healthier relationships with food across university populations.

Limitations

This systematic review has several important limitations that should be considered when interpreting the findings. The variability in assessment tools across studies may affect the comparability of results, while the predominance of cross-sectional designs limits our ability to establish causal relationships. The generalizability of findings may be constrained by the overrepresentation of female participants, the underrepresentation of graduate students, and geographical concentration in Western populations. Additionally, the potential exclusion of non-English studies may introduce selection bias. These limitations underscore the need for future research employing standardized methodologies, longitudinal designs, and more diverse, representative samples to strengthen the evidence base in this field.

Conflict of interest

This study was not supported by any funding agency, and there were no conflicts of interest.

Authors' contribution

The manuscript was drafted under their supervision, incorporating critical intellectual input from Dr. Abdulrahman A. Alsayegh and Dr. Monami Mukherjee Mondal. The entire research team analysed and pooled the data along with the drafting of the entire manuscript.

Statistical analyses were conducted by Dr. Siddharth Bose, who implemented the meta-analytical models and validation procedures. All authors participated in the interpretation of results and provided substantive revisions to the final document.

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REFERENCES

1. American Psychiatric Association. (2013). Diagnostic and statistical manual of mental disorders (5th ed.). https://doi.org/10.1176/appi.books.9780890425596
2. Dunn, T. M., & Bratman, S. (2016). On orthorexia nervosa: A review of the literature and proposed diagnostic criteria. Eating Behaviors, 21, 11-17. https://doi.org/10.1016/j.eatbeh.2015.12.006
3. Eisenberg, D., Nicklett, E. J., Roeder, K., & Kirz, N. E. (2011). Eating disorder symptoms among college students: Prevalence, persistence, and correlates. Journal of American College Health, 59(8), 700-707. https://doi.org/10.1080/07448481.2010.546461
4. Strahler, J., Hermann, A., Walter, B., & Stark, R. (2018). Orthorexia nervosa: A behavioral complex or a psychological condition? Journal of Behavioral Addictions, 7(4), 1143-1156. https://doi.org/10.1556/2006.7.2018.129
5. Delinsky, S. S., & Wilson, G. T. (2008). Weight gain, dietary restraint, and disordered eating in the freshman year of college. Eating Behaviors, 9(1), 82-90. https://doi.org/10.1016/j.eatbeh.2007.06.001
6. Lipson, S. K., & Sonneville, K. R. (2017). Eating disorder symptoms among undergraduate and graduate students at 12 U.S. colleges and universities. Eating Behaviors, 24, 81-88. https://doi.org/10.1016/j.eatbeh.2016.12.003
7. White, S., Reynolds-Malear, J. B., & Cordero, E. (2011). Disordered eating and the use of unhealthy weight control methods in college students. Journal of American College Health, 59(6), 531-536. https://doi.org/10.1080/07448481.2010.515987
8. Shanmugam, V., Jowett, S., & Meyer, C. (2012). Eating psychopathology amongst athletes: Links to current attachment styles. Eating Behaviors, 13(1), 5-12. https://doi.org/10.1016/j.eatbeh.2011.09.004
9. Barnes, M., & Caltabiano, M. (2017). The interrelationship between orthorexia nervosa, perfectionism, body image, and attachment style. Eating and Weight Disorders, 22(1), 177-184. https://doi.org/10.1007/s40519-016-0280-x
10. Dunn, T. M., Gibbs, J., Whitney, N., & Starosta, A. (2017). Prevalence of orthorexia nervosa among nutrition students. Journal of the Academy of Nutrition and Dietetics, 117(5), 697-703. https://doi.org/10.1016/j.jand.2016.10.012
11. Bo, S., Zoccali, R., Ponzo, V., Soldati, L., De Carli, L., Benso, A., ... & Abbate-Daga, G. (2014). University courses, eating problems, and muscle dysmorphia: Are there any associations? Journal of Translational Medicine, 12(1), 221. https://doi.org/10.1186/s12967-014-0221-2
12. McComb, S. E., & Mills, J. S. (2019). Orthorexia nervosa: A review of psychosocial risk factors. Appetite, 140, 50-75. https://doi.org/10.1016/j.appet.2019.05.005
13. Hoerr, S. L., Bokram, R., Lugo, B., Bivins, T., & Keast, D. R. (2013). Associations among emotional eating, stress, and diet quality in college students. Journal of American College Health, 61(5), 287-295. https://doi.org/10.1080/07448481.2013.785597
14. Santarossa, S., & Woodruff, S. J. (2017). #SocialMedia: Exploring the relationship of social networking sites on body image and eating disorders. Journal of Eating Disorders, 5(1), 1-8. https://doi.org/10.1186/s40337-017-0169-8
15. Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., ... & Moher, D. (2021). The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. BMJ, 372, n71. https://doi.org/10.1136/bmj.n71
16. Herzog, R., Álvarez-Pasquin, M. J., Díaz, C., Del Barrio, J. L., Estrada, J. M., & Gil, Á. (2013). Are healthcare workers' intentions to vaccinate related to their knowledge, beliefs and attitudes? A systematic review. BMC Public Health, 13(1), 1-17. https://doi.org/10.1186/1471-2458-13-154
17. Popay, J., Roberts, H., Sowden, A., Petticrew, M., Arai, L., Rodgers, M., ... & Duffy, S. (2006). Guidance on the conduct of narrative synthesis in systematic reviews. A Product from the ESRC Methods Programme, 1(1), b92. https://doi.org/10.13140/2.1.1018.4643
18. Sterne, J. A., Hernán, M. A., Reeves, B. C., Savović, J., Berkman, N. D., Viswanathan, M., ... & Higgins, J. P. (2016). ROBINS-I: A tool for assessing risk of bias in non-randomised studies of interventions. BMJ, 355, i4919. https://doi.org/10.1136/bmj.i4919
19. Oberle, C. D., et al. (2021). Orthorexia nervosa: Examining the Eating Habits Test's reliability and validity. Journal of Clinical Psychology, 77(6), 1456-1469. https://doi.org/10.1002/jclp.23118
20. Quick, V., Nansel, T. R., Liu, D., Lipsky, L. M., Due, P., & Iannotti, R. J. (2013). Body image perception and weight control behavior among US adolescents. American Journal of Health Behavior, 37(4), 581-591. https://doi.org/10.5993/AJHB.37.4.14
21. Rodgers, R. F., et al. (2020). The impact of the COVID-19 pandemic on eating disorder risk and symptoms. International Journal of Eating Disorders, 53(7), 1166-1170. https://doi.org/10.1002/eat.23318
22. Pike, K. M., et al. (2021). Cultural trends and eating disorders. Current Opinion in Psychiatry, 34(6), 569-574. https://doi.org/10.1097/YCO.0000000000000734
23. Shriver, L. H., Harrist, A. W., Page, M., Hubbs-Tait, L., Moulton, M., & Topham, G. (2013). Differences in body esteem by weight status, gender, and physical activity among young elementary school-aged children. Body Image, 10(1), 78-84. https://doi.org/10.1016/j.bodyim.2012.10.005
24. Nutley, S. K., Falcone, M., & Loughran, T. (2021). Differences in eating disorder symptoms and affect regulation for residential eating disorder patients with and without exercise compulsion. Eating and Weight Disorders, 26(1), 305–312. https://doi.org/10.1007/s40519-020-00850-6
25. Lupis, S. B., Sabik, N. J., & Wolf, J. M. (2014). Role of shame and body esteem in cortisol stress responses. Journal of Behavioral Medicine, 37(3), 477–487. https://doi.org/10.1007/s10865-013-9503-z

26. Missbach, B., Dunn, T. M., & König, J. S. (2017). We need new tools to assess orthorexia nervosa. A commentary on "Prevalence of orthorexia nervosa among college students based on Bratman's test and associated tendencies." Appetite, 108, 521–524. https://doi.org/10.1016/j.appet.2016.07.010
27. Donini, L. M., Barrada, J. R., Barthels, F., Dunn, T. M., Babeau, C., Brytek-Matera, A., Cena, H., Cerolini, S., Cho, H., Coimbra, M., Cuzzolaro, M., Ferreira, C., Grammatikopoulou, M. G., Hallit, S., Håman, L., Hay, P., Jimbo, M., Lasson, C., Linardon, J., ... Varga, M. (2022). A consensus document on definition and diagnostic criteria for orthorexia nervosa. Eating and Weight Disorders, 27(4), 3695–3711. https://doi.org/10.1007/s40519-022-01512-5
28. Bratman, S. (2017). Orthorexia vs. theories of healthy eating. Eating and Weight Disorders, 22(3), 381–385. https://doi.org/10.1007/s40519-017-0417-6
29. Malmberg, C., Råstam, M., Wade, T., & Hadjikhani, N. (2020). Orthorexia nervosa: A cross-sectional study among dietitians and nutrition students. Scandinavian Journal of Psychology, 61(6), 861–866. https://doi.org/10.1111/sjop.12660