

## Assessment of Obesity-Related Content and Core Competencies in Doctor of Pharmacy Programs: A Nationwide Survey

Stefan Popescu<sup>1\*</sup>, Andrei Ionescu<sup>1</sup>

<sup>1</sup>Department of Clinical Pharmacy and Public Health, Faculty of Pharmacy, University of Bucharest, Bucharest, Romania.

\*E-mail ✉ stefan.popescu@gmail.com

### Abstract

To examine how obesity-related content is incorporated within Doctor of Pharmacy (PharmD) schools and colleges, determine the level of alignment between curricula and established obesity competencies, and identify potential areas for growth in obesity management education. A nationwide, web-based questionnaire was distributed to leaders of PharmD programs in the United States. Participants provided information regarding obesity-focused instruction within their pharmacy curricula. Responses were summarized collectively using descriptive statistical analyses. Completed surveys were received from 75 out of 150 PharmD programs, representing a 50% response rate. Roughly one-third of respondents (32%) believed that their graduating students were very well prepared to counsel patients on obesity pharmacotherapy, including anti-obesity medications. Less than half (45%) indicated that pharmacologic management of obesity was addressed to a great extent in their programs. Only 19% of respondents reported being personally very familiar with anti-obesity medications, while 21% believed their students had a comparable level of familiarity. No programs reported extensive coverage of weight stigma or discrimination. Most respondents considered obesity education to be fairly or very important (88%) and appropriate (96%) for inclusion in PharmD curricula; however, 72% reported that expanding obesity-related instruction was a low or nonexistent priority. Insufficient curricular space was identified as the primary challenge, with 60% citing it as a major barrier. Although pharmacists serve as medication experts and are essential contributors to healthcare teams, obesity management and pharmacotherapy receive limited emphasis within pharmacy education. As a result, many pharmacists may lack adequate preparation to counsel patients regarding obesity medications. Adoption of established obesity competency frameworks and available educational resources may facilitate the expansion of obesity-related training in pharmacy programs.

**Keywords:** Pharmacists, Curriculum, Obesity management, Anti-obesity agents, Schools, Pharmacy

### Introduction

Obesity is a prevalent chronic condition characterized by disrupted energy balance [1] and affects more than 42% of adults in the United States (US) [2]. Defined as a body mass index of  $\geq 30$  kg/m<sup>2</sup>, obesity substantially increases the likelihood of developing cardiometabolic diseases and other conditions, such as type 2 diabetes mellitus,

cancer, stroke, asthma, and osteoarthritis [3–5]. The economic impact of obesity is considerable, accounting for nearly half of the combined direct and indirect costs associated with chronic diseases in the US as of 2016, with total expenditures estimated at \$1.72 trillion [6]. Sustained weight reduction, particularly a loss of 5% or more of body weight, has been associated with improvements in clinical outcomes [7–9] and reductions in healthcare spending [10–12]. However, long-term weight maintenance remains challenging [13–15]. When lifestyle changes such as calorie restriction and increased physical activity are combined with pharmacotherapy—commonly referred to as anti-obesity medications (AOMs)—obesity management can be more effective [16–18], and this approach is supported by clinical

Access this article online

<https://smerpub.com/>

Received: 01 September 2023; Accepted: 04 December 2023

Copyright CC BY-NC-SA 4.0

**How to cite this article:** Popescu S, Ionescu A. Assessment of Obesity-Related Content and Core Competencies in Doctor of Pharmacy Programs: A Nationwide Survey. *Ann Pharm Educ Saf Public Health Advocacy*. 2023;3(2):111-20. <https://doi.org/10.51847/KbbMHEBThM>

practice guidelines [19, 20]. Several AOMs have received approval from the US Food and Drug Administration for long-term obesity treatment [21], with newer agents demonstrating marked weight loss benefits [22, 23]. Effective obesity care depends on multiple factors, including access to appropriate treatments, insurance coverage for AOMs, and supportive healthcare and social policies. Equally critical is the education and training of healthcare professionals in obesity management, which has been shown to be insufficient in medical schools and residency programs [24–26], contributing to inadequate obesity care delivery [27–29]. To address gaps in professional training, the Provider Training and Education Workgroup of the Integrated Clinical and Social Systems for the Prevention and Management of Obesity Innovation Collaborative developed the Provider Competencies for the Prevention and Management of Obesity [30]. This initiative operates within the Strategies to Overcome and Prevent (STOP) Obesity Alliance, which includes multiple professional organizations such as the American Association of Colleges of Pharmacy (AACP) [31]. Building on this work, the Obesity Medicine Education Collaborative further refined these competencies to support obesity education across medical training programs [32]. The competencies encompass essential areas of obesity care, including pathophysiology, obesity-related comorbidities, weight stigma and discrimination, pharmacologic interventions, and behavioral, physical, and nutritional considerations, while emphasizing interprofessional collaboration [33].

Pharmacists play a vital role within healthcare teams and are uniquely positioned to assist patients with obesity, particularly in relation to medication management. Professional organizations such as the AACP and the American College of Clinical Pharmacy (ACCP) recognize the importance of pharmacists in obesity care [34, 35]. Due to their frequent patient interactions, pharmacists may also contribute to reducing obesity-related stigma and addressing implicit bias [36, 37]. Targeted education on weight bias is therefore necessary within pharmacy programs and may be incorporated through interprofessional education (IPE), as highlighted by Winters and Johnson [38]. The objectives of this study were to (1) evaluate how obesity education and training are currently integrated into US Doctor of Pharmacy

(PharmD) curricula; (2) identify discrepancies between established obesity competencies [33] and existing pharmacy curricula; and (3) explore opportunities to enhance training related to obesity management and AOMs within PharmD programs.

## Materials and Methods

### *Study design and participants*

An anonymous, web-based survey was administered to leaders of PharmD programs between October 31, 2021, and January 24, 2022. Ethical review was conducted by the WCG Institutional Review Board, which determined that the study met criteria for exemption. Using the Pharmacy College Application Service (PharmCAS) PharmD Directory [39], 150 PharmD programs were identified after excluding 1 international program and 7

### *Statistical analyses*

All responses were anonymized and analyzed collectively using descriptive statistics, including means and frequency distributions, with Q Research Software for Windows 23 (a Division of Displayr, Inc.). Categorical variables are reported as percentages, while continuous variables are presented as mean  $\pm$  SD unless otherwise noted. Percentage values were rounded to the nearest whole number.

## Results and Discussion

### *Sample characteristics*

Of the 150 PharmD programs invited, 75 completed the survey, yielding a response rate of 50%. The median completion time was 18 min. Respondents indicated that their professional responsibilities were divided among administration (50%), teaching (30%), and other activities such as research, clinical service, and scholarship (20%). Nearly all respondents reported being either very (43%) or extremely (53%) knowledgeable about their institution's curriculum. All participants (100%) stated that they were involved in decision-making related to the PharmD curriculum. Characteristics of respondents and their programs are summarized in **Table 1**. Overall, the sample reflected the geographic distribution, institutional types, and curricular structures of US PharmD programs (**Table 1**).

**Table 1.** Characteristics of pharmD curricula online survey respondents and their institutions.

| Response | n (%) <sup>a</sup> |
|----------|--------------------|
|----------|--------------------|

| Position within the Doctor of Pharmacy program                               |                                              |                                              |
|------------------------------------------------------------------------------|----------------------------------------------|----------------------------------------------|
| Professor (encompassing assistant and associate levels)                      | 40 (53)                                      |                                              |
| Dean (encompassing assistant, associate, senior, and vice dean roles)        | 34 (45)                                      |                                              |
| Coordinator for courses or curriculum                                        | 29 (39)                                      |                                              |
| Chair of department                                                          | 27 (36)                                      |                                              |
| Member or chair of curriculum committee                                      | 18 (24)                                      |                                              |
| Additional roles                                                             | 5 (7)                                        |                                              |
| Duration of employment at present institution, mean (SD)                     | 12.5 (7.4)                                   |                                              |
| Academic departments overseen                                                |                                              |                                              |
| Clinical pharmacy practice                                                   | 54 (72)                                      |                                              |
| Administrative, management, and/or social sciences                           | 34 (45)                                      |                                              |
| Basic sciences                                                               | 26 (35)                                      |                                              |
| Additional departments                                                       | 8 (11)                                       |                                              |
| Institutional location                                                       |                                              |                                              |
| Urban setting                                                                | 33 (44)                                      |                                              |
| Suburban setting                                                             | 28 (37)                                      |                                              |
| Rural setting                                                                | 14 (19)                                      |                                              |
| Total enrollment in PharmD program, mean (SD)                                | 332.9 (182.5); median: 286.5, range: 40–1000 |                                              |
| Number of faculty involved in PharmD instruction, mean (SD)                  | 40.1 (17.6); median: 35.0, range: 15–100     |                                              |
| Variable                                                                     | Survey respondents,<br>n (%) (n = 75)        | All U.S. PharmD<br>programs, n (%) (n = 150) |
| Geographic region                                                            |                                              |                                              |
| Northeast                                                                    | 11 (15)                                      | 29 (19)                                      |
| Midwest                                                                      | 18 (24)                                      | 32 (21)                                      |
| West                                                                         | 12 (16)                                      | 32 (21)                                      |
| South                                                                        | 34 (45)                                      | 56 (37)                                      |
| Other (Puerto Rico)                                                          | 0 (0)                                        | 1 (1)                                        |
| Institutional type                                                           |                                              |                                              |
| Private                                                                      | 48 (64)                                      | 79 (53)                                      |
| Public                                                                       | 27 (36)                                      | 71 (47)                                      |
| Program format                                                               |                                              |                                              |
| 0–6/7 format (2–3 years pre-pharmacy + 4 years professional)                 | 2 (3)                                        | 7 (5)                                        |
| 2–3 format (minimum 2 years pre-pharmacy + 3 years accelerated professional) | 9 (12)                                       | 21 (14)                                      |
| 2–4 format (minimum 2 years pre-pharmacy + 4 years professional)             | 29 (39)                                      | 50 (33)                                      |
| 3–4 format (minimum 3 years pre-pharmacy + 4 years professional)             | 1 (1)                                        | 9 (6)                                        |
| 4-year format (2–4 years pre-pharmacy + 4 years professional)                | 31 (41)                                      | 58 (39)                                      |
| Alternative structures                                                       | 3 (4)                                        | 5 (3)                                        |

PharmD, Doctor of Pharmacy

a Percentages exceed 100% due to the allowance of multiple responses

b Percentages may not total 100% because of rounding

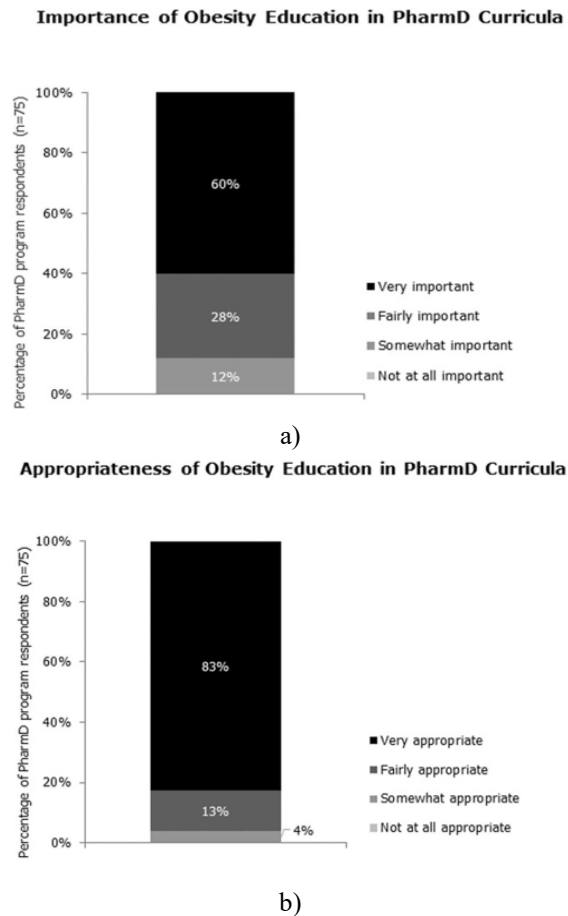
c Regional and affiliation characteristics based on the Pharmacy College Application Service PharmD Directory [39]

### *Obesity in the pharmD curricula*

The majority of respondents indicated that including obesity-related education in PharmD curricula was at least “fairly important,” and more than 80% considered

its inclusion to be “very appropriate” (**Figure 1**). Sixty-one percent of PharmD programs reported that obesity was deliberately identified as an educational objective. Only a small proportion of programs (19%) indicated that

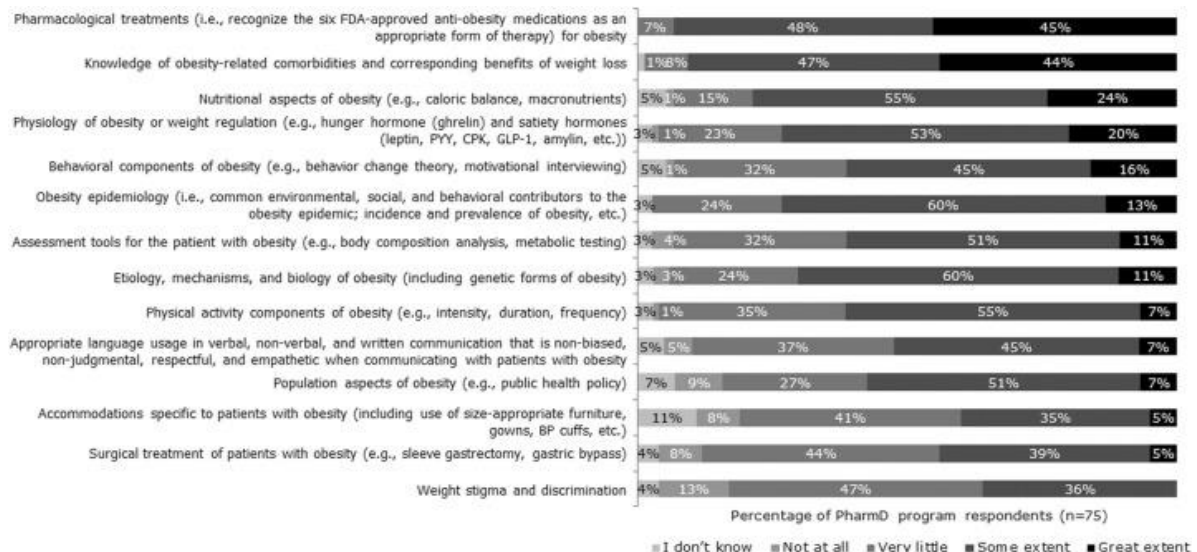
they had at least one faculty member with specialized expertise in obesity management.



**Figure 1.** Perceived importance and appropriateness of obesity education in PharmD curricula. PharmD, Doctor of Pharmacy.

Among respondents able to report curricular credit information ( $n = 53$ ), an average of 3 credits/credit hours was allocated to obesity-related instruction (median = 2.0), within a total program requirement of 155 credits/credit hours. When describing how obesity content was delivered, only 3% indicated that it was offered as an independent course. More commonly, obesity instruction was provided through a dedicated lecture embedded within another course (73%) or integrated across multiple courses (51%). Elective shadowing experiences with physicians and/or pharmacists specializing in obesity care were available in 23% of programs. In contrast, shadowing opportunities with non-medical professionals, such as dietitians or psychologists, were rare, reported by only 4% of programs.

Most respondents (79%) reported being “not at all familiar” with *The Provider Competencies for the Prevention and Management of Obesity* [33]. Nineteen percent indicated being “somewhat familiar,” while none reported being “very familiar” with these competencies. Among the core competency areas, pharmacologic management of obesity and understanding obesity-related comorbid conditions were most frequently addressed in PharmD curricula (**Figure 2**). Obesity physiology was covered to at least “some extent” in 73% of programs, while respectful communication practices for patients with obesity were addressed at this level in 52% of schools. No program reported covering weight stigma and discrimination to a “great extent.”

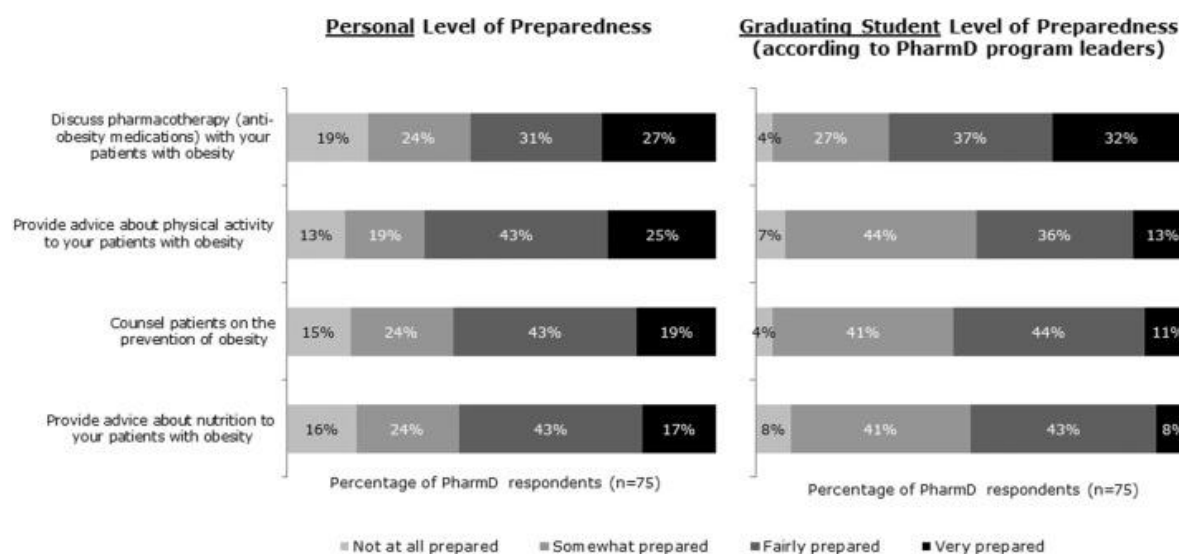


**Figure 2.** Degree to which obesity-related core competencies are addressed across PharmD curricula. PharmD; Doctor of Pharmacy.

#### *Preparedness in addressing obesity-specific topics*

Most leaders of PharmD programs indicated that they felt at least “fairly prepared” to communicate about obesity-related issues when caring for patients with obesity (**Figure 3**). In contrast, student readiness was perceived as comparable only in the area of pharmacotherapy, with lower preparedness reported for all remaining domains (**Figure 3**). Fewer than one-quarter of program leaders described themselves as “very prepared” to discuss obesity pharmacotherapy with patients, whereas 32%

believed their students reached this highest level of preparedness (**Figure 3**). Although nearly all respondents (93%) reported being at least “somewhat familiar” with prescription anti-obesity medications (AOMs) approved by the US Food and Drug Administration, fewer than one in five (19%) considered themselves “very familiar.” A similar pattern was reported for students: 97% were perceived as at least “somewhat familiar,” yet only 21% were viewed as “very familiar” with AOMs.

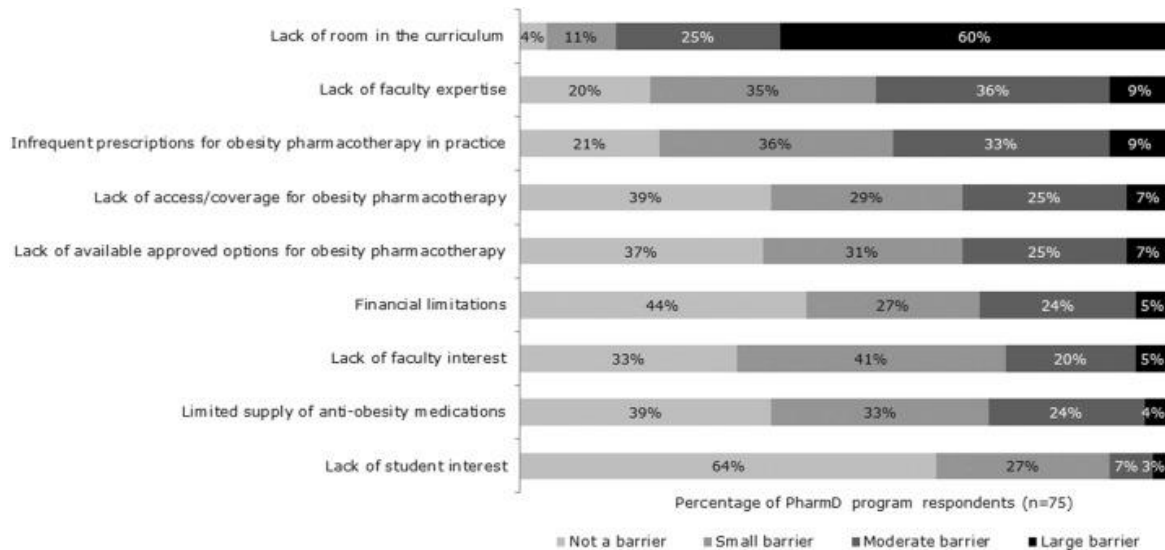


**Figure 3.** Self-reported preparedness of PharmD program leaders and perceived preparedness of students to manage obesity-related topics in patient care. PharmD; Doctor of Pharmacy.

#### *Expanding obesity education in pharmD curricula*

Expansion of obesity-focused instruction was identified as a low or nonexistent priority by most programs (72%), whereas only 1% classified it as a high priority. Formal conversations about adding or expanding structured obesity education had occurred in just 13% of pharmacy schools. When asked about future implementation, 39% anticipated curricular changes related to obesity no

sooner than 2 years from the time of the survey, while 40% reported no expectation that obesity education would be expanded at all. Insufficient curricular space was most frequently cited as the primary obstacle to incorporating obesity-related content (**Figure 4**). Other barriers were rated as small to moderate and included limited faculty expertise and restricted availability of obesity pharmacotherapy options (**Figure 4**).



**Figure 4.** Reported challenges limiting the inclusion of obesity education within PharmD curricula. PharmD; Doctor of Pharmacy.

Guidance issued by the Accreditation Council for Pharmacy Education (ACPE), ACCP, and AACP was perceived as the most influential driver of obesity education, with 81% of respondents rating such guidance as at least “fairly impactful.” Interprofessional education (IPE) resources involving collaboration between PharmD students and other healthcare disciplines were considered at least “fairly impactful” by 76% of respondents. National certification in obesity for PharmD students was viewed as “fairly impactful” or “very impactful” by 65% of program leaders. Nearly all respondents (93%) indicated that ACPE exerted a “great deal of influence” over curricular content at their institutions, compared with substantially lower influence attributed to AACP (37%), ACCP (16%), and the American Public Health Association (4%).

When evaluating potential healthcare system changes, respondents most often identified reimbursement for obesity and lifestyle management services—including pharmacist compensation—as “fairly impactful” (24%) or “very impactful” (65%) in increasing obesity-related instruction. Improved access to and insurance coverage for obesity pharmacotherapy was rated as at least “fairly impactful” by 73% of respondents, followed by growth in obesity-focused healthcare practices (73%), enhancements in available pharmacotherapy options (69%), and the availability of additional evidence related to obesity pharmacotherapy (55%).

Obesity is a complex, long-term condition that requires coordinated care across multiple healthcare disciplines,

with pharmacists positioned as key contributors. This study evaluated the current treatment of obesity-related content within US PharmD curricula and examined the extent to which essential obesity competencies are addressed. The findings expand the limited body of research focused specifically on obesity education in PharmD programs [40, 41] and highlight areas where pharmacy education may be strengthened to better prepare future practitioners.

Overall, program leaders perceived pharmacy students as insufficiently prepared to assist patients with obesity, a finding that likely reflects limited curricular emphasis on obesity-related competencies. Only about one-third of respondents believed that graduating students were very prepared to counsel patients on obesity pharmacotherapy, while a similar proportion indicated that students were only somewhat prepared or not prepared at all. These perceptions align with reported familiarity levels for AOMs, as approximately 20% of respondents considered themselves and their students to be very familiar with these agents. Although pharmacologic management of obesity received greater curricular attention than other competency areas, fewer than half of programs covered this topic to a great extent, paralleling coverage levels for obesity-related comorbidities and the benefits of weight loss. Instruction related to respectful, person-first communication with individuals living with obesity was less consistently addressed. Moreover, weight stigma received minimal attention, with approximately 6 in 10 programs providing little or no coverage, underscoring a

critical gap in pharmacy education that warrants targeted improvement [38]. Limited exposure to obesity management—and to AOMs in particular—is concerning, given pharmacists' responsibilities as medication experts and their role in counseling patients and collaborating with other healthcare professionals regarding drug selection, mechanisms of action, dosing strategies, and adverse effects.

Most pharmacy program directors expressed consensus that obesity-related instruction is both important and suitable for inclusion in PharmD curricula, a position that aligns with views held by national pharmacist organizations and leaders within pharmacy education [34, 35, 42]. Support for this position is further demonstrated by the wide range of pharmacist-led interventions documented in reviews by Clements *et al.* [35], Jordan and Harmon [43], and Rosenthal *et al.* [44], as well as by a pilot initiative emphasizing physical activity and nutrition evaluated by Robles *et al.* [45]. Despite this evidence, insufficient knowledge of obesity care—including the use of anti-obesity medications (AOMs)—continues to impede implementation of pharmacist-driven interventions [43]. Earlier findings from a 2007 survey conducted by Lenz *et al.* [40] revealed that few pharmacy schools offered or mandated coursework addressing lifestyle modification topics such as diet and exercise. Consistent with these prior observations, our findings indicate substantial gaps remain in the incorporation of obesity management content within pharmacy education. Although many respondents reported that obesity was deliberately identified as an educational objective, obesity-related content was most often framed as a contributing risk factor for other conditions rather than as a chronic disease characterized by dysregulation of energy homeostasis.

A clear mismatch was identified between the perceived importance and appropriateness of obesity education and the level of curricular priority assigned to its expansion. Very few PharmD programs regarded increasing obesity-related instruction as a high priority, and many indicated that such expansion was unlikely to occur. Limited curricular capacity was most frequently identified as the primary barrier. Slightly fewer than half of the programs identified insufficient faculty expertise and low prescribing rates of AOMs among healthcare professionals as at least moderate obstacles. Nearly one-third of respondents cited limited availability of obesity pharmacotherapy options as a barrier, despite evidence supporting the efficacy and availability of multiple

AOMs [21–23]. Overall, these findings suggest that challenges related to obesity education stem less from a lack of interest and more from perceived constraints on how this topic can be effectively integrated into existing curricula.

Educational initiatives have been shown to meaningfully enhance knowledge and attitudes toward obesity care. For example, Sanchez-Ramirez *et al.* [46] demonstrated that a single-day interprofessional obesity-focused educational activity led to self-reported improvements in professional competence and attitudes among healthcare providers, including pharmacists. Similar outcomes were reported by Verma *et al.* [47] in their evaluation of an educational intervention targeting community pharmacists in Malaysia. In the present study, respondents reported limited availability of faculty with specialized expertise in obesity care, as well as a scarcity of elective shadowing opportunities involving healthcare professionals who manage obesity. Nevertheless, lack of curricular space remained the only barrier consistently identified as a major impediment to expanding obesity education in PharmD programs.

Addressing these challenges may be facilitated by drawing on successful models from other institutions that have emphasized obesity education. One such example is Auburn University's Harrison School of Pharmacy, which developed an integrated curriculum designed to equip students to provide obesity management services within their communities [48]. External and supplemental resources may also help mitigate institutional barriers. The Obesity Medicine Association provides the Obesity Treatment Proficiency Badge, a structured program for healthcare professionals—including pharmacists—that comprises 25 courses and case-based learning modules [49]. In addition, the American Society of Health-System Pharmacists offers a self-paced, online weight management certificate that delivers continuing education in obesity care [50]. Such self-directed learning programs may offer a practical approach for expanding obesity-related training opportunities for pharmacy students.

### Limitations

This study has several limitations. Although responder bias is possible, the consistency of findings suggests that participants provided candid responses. Nonetheless, respondents' perceptions of obesity-related curricular coverage may not reflect the views of other program leaders or administrators within the same institutions.

Estimates of credit hours devoted to obesity may also be inflated; however, even these estimates accounted for less than 2% of total PharmD credit hours, indicating limited overall coverage. The study did not evaluate how or to what extent obesity content may have been embedded within courses primarily focused on other topics, which could result in an underestimation of obesity-related instruction. Sample size was constrained by the total number of US pharmacy schools, and generalizability may therefore be limited to participating institutions. However, the sample reflects national distributions with respect to geographic region, institution type, and curricular structure. Larger programs may have been more likely to participate due to having multiple eligible contacts. Additionally, interest in obesity education may have influenced participation, potentially leading to overrepresentation of respondents with a stronger interest in the topic. If present, this bias would likely result in underestimation rather than overestimation of the identified gaps. Finally, this study focused exclusively on obesity education within PharmD curricula and did not allow comparison with training provided for other disease states. Future studies examining multiple therapeutic areas may offer a broader context for evaluating obesity education.

### Conclusion

Faculty perceptions indicate that fewer than one-third of pharmacy students are highly prepared to counsel patients regarding AOMs. Given pharmacists' central role on healthcare teams and their expertise in pharmacotherapy, this represents a critical educational gap.

Enhancing the quality of care for individuals with obesity requires ensuring that pharmacists possess sufficient knowledge and competencies in obesity management, particularly with respect to pharmacotherapy. Pharmacy education can address this need by expanding obesity-related training and leveraging existing frameworks such as the Provider Competencies for the Prevention and Management of Obesity, along with available external educational resources.

**Acknowledgments:** None

**Conflict of Interest:** None

**Financial Support:** None

**Ethics Statement:** None

### References

1. Kumar, R.B. · Srivastava, G. · Reid, T.J. Understanding the pathophysiologic pathways that underlie obesity and options for treatment *Expert Rev Endocrinol Metab.* 2021; 16:321-338
2. Hales, C.M. · Carroll, M.D. · Fryar, C.D. ...Prevalence of obesity and severe obesity among adults: United States, 2017-2018 *NCHS Data Brief.* 2020; 360:1-8
3. Guh, D.P. · Zhang, W. · Bansback, N. ...The incidence of co-morbidities related to obesity and overweight: a systematic review and meta-analysis *BMC Public Health.* 2009; 9:88.
4. Haase, C.L. · Eriksen, K.T. · Lopes, S. ...Body mass index and risk of obesity-related conditions in a cohort of 2.9 million people: evidence from a UK primary care database *Obes Sci Pract.* 2021; 7:137-147.
5. Mechanick, J.I. · Farkouh, M.E. · Newman, J.D. ...Cardiometabolic-based chronic disease, adiposity and dysglycemia drivers: JACC state-of-the-art review. *J Am Coll Cardiol.* 2020; 75:525-538.
6. Waters H., Graf M. The costs of chronic disease in the U.S.; 2018. Milken Institute. <https://milkeninstitute.org/sites/default/files/reports-pdf/ChronicDiseases-HighRes-FINAL.pdf>. Accessed October 20, 2021.
7. Bailey-Davis, L. · Wood, G.C. · Benotti, P. Impact of sustained weight loss on cardiometabolic outcomes *Am J Cardiol.* 2022; 162:66-72.
8. Ryan, D.H. · Yockey, S.R. Weight loss and improvement in comorbidity: differences at 5%, 10%, 15%, and over *Curr Obes Rep.* 2017; 6:187-194.
9. Wood, G.C. · Bailey-Davis, L. · Benotti, P. ...Effects of sustained weight loss on outcomes associated with obesity comorbidities and healthcare resource utilization *PLoS One.* 2021; 16, e0258545.
10. Cawley, J. · Meyerhoefer, C. · Biener, A. ...Savings in medical expenditures associated with reductions in body mass index among US adults with obesity, by diabetes status *Pharmacoeconomics.* 2015; 33:707-722
11. Ding, Y. · Fan, X. · Blanchette, C.M. Economic value of nonsurgical weight loss in adults with obesity. *J Manag Care Spec Pharm.* 2021; 27:37-50.

12. Thorpe, K. · Toles, A. · Shah, B. ...Weight loss-associated decreases in medical care expenditures for commercially insured patients with chronic conditions. *J Occup Environ Med.* 2021; 63:847-851.
13. Douketis, J.D. · Macie, C. · Thabane, L. ...Systematic review of long-term weight loss studies in obese adults: clinical significance and applicability to clinical practice. *Int J Obes.* 2005; 29:1153-1167.
14. Ghanemi, A. · Yoshioka, M. · St-Amand, J. Broken energy homeostasis and obesity pathogenesis: the surrounding concepts. *J Clin Med.* 2018; 7:453.
15. Sumithran, P. · Prendergast, L.A. · Delbridge, E. Long-term persistence of hormonal adaptations to weight loss. *N Engl J Med.* 2011; 365:1597-1604.
16. Bray, G.A. · Ryan, D.H. Evidence-based weight loss interventions: individualized treatment options to maximize patient outcomes. *Diabetes Obes Metab.* 2021; 23:50-62.
17. Friedrichsen, M. · Breitschaft, A. · Tadayon, S. ...The effect of semaglutide 2.4 mg once weekly on energy intake, appetite, control of eating, and gastric emptying in adults with obesity. *Diabetes Obes Metab.* 2021; 23:754-762.
18. Khera, R. · Murad, M.H. · Chandar, A.K. ...Association of pharmacological treatments for obesity with weight loss and adverse events: a systematic review and meta-analysis. *JAMA.* 2016; 315:2424-2434.
19. Garvey, W.T. · Mechanick, J.I. · Brett, E.M. ...American Association of Clinical Endocrinologists and American College of Endocrinology comprehensive clinical practice guidelines for medical care of patients with obesity. *Endocr Pract.* 2016; 22:1-203.
20. Wharton, S. · Lau, D.C.W. · Vallis, M. ...Obesity in adults: a clinical practice guideline. *CMAJ.* 2020; 192:E875-E891. Crossref Scopus (547) PubMed Google Scholar
21. Daneschvar, H.L. · Aronson, M.D. · Smetana, G.W. FDA-approved anti-obesity drugs in the United States. *Am J Med.* 2016; 129:879.
22. Jastreboff, A.M. · Aronne, L.J. · Ahmad, N.N. ...Tirzepatide once weekly for the treatment of obesity. *N Engl J Med.* 2022; 387:205-216.
23. Rubino, D. · Abrahamsson, N. · Davies, M. ...Effect of continued weekly subcutaneous semaglutide vs placebo on weight loss maintenance in adults with overweight or obesity: the STEP 4 randomized clinical trial. *JAMA.* 2021; 325:1414-1425.
24. Butsch, W.S. · Kushner, R.F. · Alford, S. ...Low priority of obesity education leads to lack of medical students' preparedness to effectively treat patients with obesity: results from the U.S. medical school obesity education curriculum benchmark study. *BMC Med Educ.* 2020; 20:23.
25. Butsch, W.S. · Robison, K. · Sharma, R. ...Medicine Residents are Unprepared to Effectively Treat Patients with Obesity: Results from a U.S. Internal Medicine Residency Survey. 2382120520973206. *J Med Educ Curric Dev.* 2020; 25, 2382120520973206.
26. Orjuela-Grimm, M. · Butsch, W.S. · Bhatt-Carreño, S. ...Benchmarking of provider competencies and current training for prevention and management of obesity among family medicine residency programs: a cross-sectional survey. *BMC Fam Pract.* 2021; 22:132.
27. Kim, T.N. Barriers to obesity management: patient and physician factors. *J Obes Metab Syndr.* 2020; 29:244-247.
28. Simon, R. · Lahiri, S.W. Provider practice habits and barriers to care in obesity management in a large multicenter health system. *Endocr Pract.* 2018; 24:321-328.
29. Tucker, S. · Bramante, C. · Conroy, M. ...The most undertreated chronic disease: addressing obesity in primary care settings. *Curr Obes Rep.* 2021; 10:396-408.
30. Bradley D.W., Dietz W.H., the Provider Training and Education Workgroup. Provider competencies for the prevention and management of obesity; Updated 2017. Strategies to Overcome and Prevent (STOP) obesity alliance. Provider Competencies & Resources. <https://obesitycompetencies.gwu.edu/wp-content/uploads/2018/10/Obesity-Care-Competencies.pdf>. Accessed July 6, 2022.
31. About. Strategies to Overcome and Prevent (STOP) obesity alliance. Provider Competencies & Resources. <https://www.obesitycompetencies.gwu.edu/about>. Accessed July 6, 2022. Google Scholar
32. Kushner, R.F. · Horn, D.B. · Butsch, W.S. ...Development of obesity competencies for medical education: a report from the Obesity Medicine

- Education Collaborative Obesity. 2019; 27:1063-1067.
33. Obesity competencies; 2018. Obesity Medicine Education Collaborative. <https://obesitymedicine.org/wp-content/uploads/2022/05/Obesity-Medicine-Education-Collaborative-Competencies-Web.pdf>. Accessed July 19, 2022. Google Scholar
34. A new outlook on obesity. American Association of Colleges of Pharmacy (AACP). <https://www.aacp.org/article/new-outlook-obesity>. Accessed July 6, 2022.
35. Clements, J.N. · Albanese, N.P. · D'Souza, J.J. ...Clinical review and role of clinical pharmacists in obesity management: an opinion of the endocrine and metabolism practice and research network of the American College of Clinical Pharmacy. *J Am Coll Clin Pharm*. 2021; 4:1469-1484.
36. Clements, J.N. · Akins, K.B. A cross-sectional study of student pharmacists' attitudes and self-awareness towards obesity and weight. *Curr Pharm Teach Learn*. 2021; 13:1654-1658.
37. Murphy, A.L. · Gardner, D.M. A scoping review of weight bias by community pharmacists towards people with obesity and mental illness. *Can Pharm J*. 2016; 149:226-235.
38. Winters, A. · Johnson, H.E. The role of pharmacy education in mitigating weight bias. .... *Am J Pharm Educ*. 2022; 86:ajpe8844.
39. Pharm D. Directory. Pharmacy college application service (PharmCAS). <https://www.pharmacas.org/school-directory/pharmd-directory>. Accessed June 15, 2021.
40. Lenz, T.L. · Monaghan, M.S. · Hetterman, E.A. Therapeutic lifestyle strategies taught in U.S. pharmacy schools. *Prev Chronic Dis*. 2007; 4:A96.
41. Vinti A., Kelley K., Liles A., Eiland L. Comparison of coverage of obesity and post-bariatric surgery medication-related issues in the curriculum. Paper presented at: 2010 American College of Clinical Pharmacy Spring Practice and Research Forum; April 23–27, 2010; Charlotte, NC.
42. Smith, R.E. · Olin, B.R. Wellness: pharmacy education's role and responsibility. *Am J Pharm Educ*. 2010; 74:69.
43. Jordan, M.A. · Harmon, J. Pharmacist interventions for obesity: improving treatment adherence and patient outcomes. *Integr Pharm Res Pract*. 2015; 4:79-89.
44. Rosenthal, M. · Ward, L.M. · Teng, J. Weight management counselling among community pharmacists: a scoping review. *Int J Pharm Pract*. 2018; 26:475-484.
45. Robles, J. · Gutierrez, A. · Seifert, C.F. Impact of a pilot pharmacy health-care professional out-of-school time physical activity and nutrition education program with exercise on fourth and fifth graders in a rural Texas community. *SAGE Open Med*. 2014; 2.
46. Sanchez-Ramirez, D.C. · Long, H. · Mowat, S. ...Obesity education for front-line healthcare providers. *BMC Med Educ*. 2018; 18:278.
47. Verma, R.K. · Chong, W.W. · Taha, N.A. Impact of an educational training program on the knowledge, attitude, and perceived barriers of community pharmacists towards obesity and overweight management in Malaysia. *Front Public Health*. 2021; 9, 720939.
48. Curating the obesity care competencies final report. Strategies to Overcome and Prevent (STOP) obesity alliance; 2019. <https://www.obesitycompetencies.gwu.edu/wp-content/uploads/2019-Curating-the-Obesity-Care-Competencies-Report-0320.pdf>. Accessed July 6, 2022.
49. Addressing the obesity epidemic with progressive education for any licensed healthcare professional. *Bariatr Times*. 2020; 17:19-20.
50. Weight management certificate. American Society of Health-System Pharmacists (ASHP). <https://elearning.ashp.org/products/9695/weight-management-certificate>. Accessed July 7, 2022.