

Original Research Article

Beyond the Scale: An Interdisciplinary Public Health Perspective on GLP-1 Receptor Agonists, Biochemical Health, Psychological Well-Being, Exercise Adaptation, and Healthcare EquityOchor D.C.^{1*}, Nwokoma, C.J.², Udeme B.³, Christian J.⁴^{1,3}Department of Sport and Exercise Science, Faculty of Education, University of Port Harcourt, Choba, Port Harcourt, Rivers State, Nigeria²Department of Biochemistry, Faculty of Science, University of Port Harcourt, Choba, Port Harcourt, Rivers State, Nigeria⁴Department of Health Promotion, Environmental and Safety Education, Faculty of Education, University of Port Harcourt, Choba, Port Harcourt, Rivers State, Nigeria***Corresponding author:** Ochor D.C.

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Abstract: Background: The rapid expansion of glucagon-like peptide-1 receptor agonists (GLP-1 RAs) has transformed the treatment of obesity, with evidence demonstrating substantial effects on body weight, metabolic health, and cardiovascular risk. However, evaluating these medications primarily through weight reduction may overlook important psychological, functional, behavioural, and health-system consequences. This opinion paper examines the broader public-health implications of GLP-1 RAs across biochemical, clinical psychological, exercise, adherence, and healthcare-access dimensions. **Methods:** An integrative interdisciplinary literature approach was used to synthesize recent evidence from clinical trials, systematic reviews, epidemiological studies, and relevant literature in public health, biochemistry, clinical psychology, nutrition, and sport and exercise science. Evidence was organized thematically around biochemical effects, psychological outcomes, treatment adherence and social support, exercise adaptation and lean-mass preservation, and healthcare access and equity. **Results:** Evidence indicates that GLP-1 RAs can produce substantial weight loss and favourable metabolic and cardiovascular outcomes. Nevertheless, weight reduction may include reductions in lean mass, highlighting the importance of nutritional support and appropriately prescribed exercise. Current evidence does not indicate a general increase in psychiatric adverse events, although psychological adaptation, eating behaviour, motivation, treatment expectations, and quality of life remain relevant to sustained treatment. Social support may also influence adherence and long-term engagement. Furthermore, high costs, limited availability, insurance restrictions, and health-system inequalities may constrain population-level benefits, particularly in low- and middle-income settings. **Conclusions:** The paper proposes a Biopsychosocial–Biochemical–Exercise–Equity (BBEE) framework for evaluating GLP-1 therapy beyond conventional weight-loss outcomes. The framework positions metabolic health, psychological well-being, physical function, treatment adherence, social support, and equitable access as interconnected components of successful obesity management. GLP-1 RAs should therefore be integrated with nutrition, psychological support, physical activity, exercise, and accessible long-term healthcare. The central public-health proposition is that the success of obesity treatment should be measured not simply by how much weight is lost, but by how effectively health, function, well-being, and equity are improved and sustained.

Keywords: GLP-1 receptor agonists, obesity, public health, clinical psychology, exercise adaptation, healthcare equity, body composition, treatment adherence.

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1. INTRODUCTION

Obesity is a significant public health issue that is not only associated with excess weight but also with type 2 diabetes, cardiovascular disease, musculoskeletal disease, psychological disorders, poor quality of life and death. It has also grown in frequency and there is

significant pressure on health systems and effective, sustainable, and equitable treatment is now a global priority. The global prevalence of adult obesity has more than doubled since 1990, and that of children and adolescents over quadrupled, according to a pooled analysis of 3,663 population based studies from 222

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countries and territories, conducted between 1990 and 2022 by the NCD Risk Factor Collaboration (NCD-RisC) (2024). As of 2025, the World Health Organization (WHO) estimates that there are currently over 1 billion people with obesity globally and approximately 2.5 billion overweight adults in 2022. The problem is becoming more pronounced in low and middle-income countries, where diets are shifting, urbanisation has increased, there has been a decline in physical activity and socioeconomic inequalities have worsened, in addition to other health issues (Popkin *et al.*, 2020; WHO, 2022). Nigeria is one of the countries in this transforming world as obesity is a public-health problem rather than just a personal lifestyle problem. This has led to a greater interest in the search for better treatment options, especially glucagonlike peptide-1 receptor agonists (GLP-1 RAs) that have reshaped the pharmacological obesity treatment landscape in a short period of time. The appearance of this new class of treatments, though, brings up a bigger question: Should the success of an obesity treatment be almost entirely defined by weight loss, or by improvements in metabolic health, psychological well-being, physical function, treatment adherence, or access to care?

Considering GLP-1 receptor agonists impact on biological pathways that regulate appetite, glucose and energy balance, they have been given significant attention. They increase glucose induced insulin release, decrease glucagon release, slow down gastric emptying and modulate appetite and food intake (Drucker, 2018; Müller *et al.*, 2019). Clinical trials have been shown to have effects beyond weight loss. In the SELECT trial, which included 17,604 adults with cardiovascular disease without diabetes and overweight or obesity, semaglutide decreased the risk for major cardiovascular events from 8.0% in the placebo group to 6.5% in the group that received semaglutide, a 20% relative reduction in risk (Lincoff *et al.*, 2023). Semaglutide has additionally been linked to enhanced symptomatology, physical function and quality of life in individuals with obesity connected heart failure with preserved ejection fraction (Kosiborod *et al.*, 2023). The results indicate the potential of GLP-1 RAs to improve overall health, and underscore that they are not just body weight loss medications. Meanwhile, large amounts of weight loss demand that attention be paid to shifting body composition. A systematic review and network meta-analysis revealed that GLP-1-based drugs actually led to decreases in fat mass and lean mass, with lean-mass loss being around 25% of the overall weight loss (Mocciaro *et al.*, 2025). This is necessary because muscle mass is a factor in metabolic health, strength, mobility and physical independence. Similarly, Ochor *et al.*, (2025) in their review about nutrition knowledge and its biochemical implications in sport performance and recovery, also illustrate the importance of linking nutritional and biochemical changes to functional outcomes. Their study examined athletes, not people taking GLP-1 drugs, but it bolsters the concept of looking

at changes in biological measures along with physical function. An important point to consider in GLP-1 therapy is therefore not only the amount of body weight that can be lost, but whether a reduction in body weight is associated with favourable metabolic effects and maintenance of physical capacity or not.

The psychological and behavioural aspects of obesity also support the need to conduct a more comprehensive evaluation of GLP-1 use. How people respond to and adhere to treatment may be influenced by eating behaviour, emotional response, motivation, physical activity, self-efficacy, social relations and adherence to treatment. So far, there are no indications that GLP-1 RAs in general raise the psychiatric risk. A systematic review and meta-analysis revealed no significant difference in the number of serious and non-serious psychiatric adverse events between GLP-1 RA users and non-users, and reported that people taking GLP-1 RAs experienced improvements in several measures of quality of life and eating behaviours (Pillinger *et al.*, 2025). However, psychological interventions are relevant as medication is not the only thing that can change the behavioural and social context that influences long-term health. Ochor's research has shown that physical activity is associated with psychological health and his research on psychological responses to anxiety has demonstrated the role of psychological factors in maintaining effective behaviour and performance in athletes. Likewise, George *et al.*, (2026) explored emotional reactivity and perceived social support with the prevalence of problematic internet use among university students in Nigeria, thus highlighting the importance of psychological and interpersonal factors in health-related behaviour. The team's recent research on digital strategies to adolescent mental health screening also warns to the increasing prominence of accessible methods of identifying and supporting behavioural and psychological issues (George *et al.*, 2026). The studies discussed provide no direct evidence on GLP-1 treatment, but these studies are pertinent to the larger debate that psychological and social factors as well as biological factors need to be taken into account for health interventions. This is especially crucial for compliance to treatment. In their study, social support and treatment regimen adherence in emerging adults with mental illnesses, Isaiah *et al.*, (2026) give additional evidence that social relationships should be considered in sustained engagement in treatment. While their findings cannot be translated directly to GLP-1 therapy, they pose an intriguing question in obesity research: can emotional, informational and practical support assist people to sustain long-term medication use, exercise and other health-related behaviours?

The public-health impact of GLP-1 receptor agonists will depend not only on their effectiveness but also on who will be able to receive and maintain access to these. Many people with obesity may not be able to

reap the advantages of these treatments due to their high price tag, scarcity, insurance barriers, disparities in healthcare systems, or socio-economic barriers. There is evidence of inequity in obesity treatment access and use among populations (Ross *et al.*, 2025). This is particularly important in low and middle-income countries where health systems are increasingly having to prioritise between competing demands and may not have the means to access newer, high cost medicines (WHO, 2022). There is a growing body of literature on physical activity, psychological wellbeing, social support, nutrition and digital health in Nigeria that can serve as a basis for thinking about obesity in relation to other areas of health, including in Ochor and George's work and that of colleagues. The current view, however, is a dedicated focus on the use of GLP-1 for obesity treatment. Unlike other drugs, the novelty of this one is to suggest that the effect of these drugs should be evaluated on biochemical, psychological, exercise, adherence, and public-health grounds, not just by weight reduction. This includes looking at changes in metabolic markers, body composition, psychological health, treatment adherence, social support, physical activity, exercise adaptation, physical function, what it costs and whether or not they can access treatment. This shift in focus from the scale to a more meaningful public health question is whether GLP-1 receptor agonists can achieve lasting health and functioning benefits that can be reached by populations most impacted by obesity. From this perspective, an interdisciplinary exploration of GLP-1 therapy from public health, clinical psychology, biochemistry and sport and exercise science is possible.

2. MATERIALS AND METHODS

Article Design

This article is written in an opinion paper format with an integrative and interdisciplinary approach rather than as a systematic review, meta-analysis or primary empirical study. The approach chosen was based on the need to critically review the new evidence in relation to GLP-1 receptor agonists, from a public health perspective, whilst linking evidence to the biochemistry, clinical psychology, sport and exercise science, nutrition, treatment adherence and access to healthcare. With this in mind, the paper draws on existing empirical research, clinical trials, systematic reviews, epidemiological reports, and interdisciplinary research to create a coherent stance on the potential health consequences of GLP-1 obesity interventions. The methodological approach followed the principles of evidence transparently identified and synthesized from PRISMA 2020, but the paper is not reported as a systematic review and it is not considered as systematic-review completed (Page *et al.*, 2021).

Literature Identification

A structured search of PubMed/MEDLINE, Scopus, Web of Science, Google Scholar, and peer-reviewed literature and literature from authoritative health-organizations was used to identify the relevant

literature, with a focus on the major clinical evidence and peer-reviewed literature. Boolean operators were used to merge search concepts and the following terms were added: "GLP-1 receptor agonists," "semaglutide," "tirzepatide," "obesity," "weight loss," "body composition," "lean mass," "metabolic biomarkers," "psychological health," "eating behaviour," "treatment adherence," "social support," "physical activity," "exercise," "healthcare access," "health disparities," and "public health." Systematic reviews, randomized controlled trials, major epidemiological studies, clinical guidelines and recent publications were prioritized, while seminal mechanistic studies were selected to explain the biology of GLP-1 when needed to explain its biology. The literature was predominantly concentrated between 2018 and 2026 to highlight the rapid advancement of the modern anti-obesity pharmacotherapy, and older authoritative publications were included when they were important for providing a theoretical or mechanistic foundation. The studies conducted by Ochor and colleagues, and George and colleagues were used in a selective manner, as they related to the psychological, nutritional, physical activity, social support, and digital health aspects of the argument. Unlike other 'rules' of transparent evidence-synthesis, the literature identification process was not used to claim that the presented conceptual argument was covered by a systematic review (Page *et al.*, 2021).

Conceptual Synthesis

The identified evidence was synthesised in each of the following five interrelated domains: (1) biochemical and metabolic effects, (2) psychological and behavioural outcomes, (3) body composition and exercise adaptation, (4) treatment adherence and social support, and (5) healthcare access and public-health equity. First, evidence in the different domains was analysed based on their direct relevance to GLP-1 treatment and then linked to the remaining domains. Special consideration was placed on areas in which there is apparent benefit, but also significant limitations, such as the loss of weight that can occur but also may result in a loss of lean mass, eating behaviour improvements that can occur but may be difficult to maintain over time, and the clinical efficacy proven, but with unequal access to treatment. This enabled the article to go beyond the one-outcome evaluation of GLP-1 therapy and look at the drug in the context of chronic-disease management. The synthesis thus takes the approach of 'mechanism to behaviour to function to access to population health' and connects molecular effects with physical function and behaviour, and finally to implications for health systems and equity. Because this type of synthesis will not attempt to calculate a pooled treatment effect, this type of synthesis is appropriate for an opinion paper.

Conceptual Boundaries

The analysis was aimed to be deliberately limited to GLP-1 receptor agonists in the treatment of overweight and obesity and focused mainly on

semaglutide and other incretins. In addition to body weight, outcomes which are not already included in the body weight measure are also explored, such as metabolic biomarkers, body composition, psychological well-being, eating behaviour, treatment adherence, physical activity, exercise adaptation, physical function, healthcare access and health equity. Consideration of cardiovascular and quality of life outcomes is included if they show general impacts of obesity treatment. The paper does not try to be a comprehensive review of all of the GLP-1 related drugs nor does it assess the treatment of diabetes as the main indication of GLP-1 therapy. Likewise, the evidence provided by a sport and exercise population (e.g., work by Ochor *et al.*) is used in a contextually different way than it is in psychological or digital-health populations involving Nigerian populations (e.g., work by George *et al.*), and not as evidence of GLP-1 efficacy. This is an important boundary to maintain for conceptual validity and for not extrapolating across populations.

A second boundary is between the efficacy of clinical interventions and effectiveness at a population level. The evidence from randomized clinical trials is considered the strongest evidence for proving the pharmacological effectiveness while the literature of psychology, exercise, social support and health access is used to explore the circumstances under which such effects can be maintained or translated into the real world. The paper does not, therefore, presume that weight loss will necessarily lead to improved psychological health, maintenance of lean mass, continuing exercise participation, adherence with medication, or equitable access. These, however, are seen as linked, but different, outcomes that have to be taken individually. Accordingly, the central concept is that treating patients with GLP-1 should be part of a comprehensive obesity-management system in which biochemistry is the biological component, clinical psychology is the behavioural adaptation and adherence component, exercise science is the physical function and preservation of lean tissue component, and public health is the access, sustainability and equity component. This boundary sets the groundwork for the paper's thesis: As weight loss is not the sole measure of the public health benefits of GLP-1 receptor agonists, it requires supplementing with other metrics.

3. EVIDENCE SYNTHESIS AND MAJOR ARGUMENTS

3.1 Biochemical Effects

The main biological effects of GLP-1 receptor agonists are through the pathways that regulate glucose, appetite, gastric emptying, and energy balance. These medications cause significant decreases in energy intake and body weight by improving glucose-dependent insulin secretion, by inhibiting glucagon secretion and by decreasing appetite. They also have effects on anthropometric change, though. Clinical data suggests that GLP-1 treatment offers benefits on glycaemic

control, blood pressure, lipid-related risk, measures of visceral adiposity, and cardiovascular outcomes, suggesting that GLP-1 therapy can have a modifying effect on multiple pathways that underlie the role of obesity in chronic disease. For instance, adults with overweight or obesity who were treated with semaglutide had a 20% lower risk of cardiovascular disease in the SELECT trial (Lincoff *et al.*, 2023).

New findings also suggest that GLP-1 therapies selectively induce fat loss, particularly visceral adipose tissue, but lean mass loss has been reported as well (Bhandarkar *et al.*, 2025; Karakasis *et al.*, 2025). The biochemical argument should, therefore, go beyond the traditional notion of GLP-1 therapy as an appetite suppressant. The public health significance is that its beneficial effects might be realized simultaneously on adiposity, and multiple metabolic pathways linked to obesity-related disease. However, the biochemical success should be viewed in conjunction with nutritional adequacy, body composition and physical function as a decrease in body weight does not necessarily reflect an improvement in the physiology.

3.2 Psychological Effects

It's crucial to take a nuanced look at the psychological side of GLP-1 receptor agonists. Psychological distress and stigma, impaired quality of life, emotional eating, and struggles in sustaining long-term behavioural changes are all linked to obesity, and psychological well-being is an important part of treatment success. There is no current evidence to suggest that GLP-1 receptor agonists are generally detrimental to mental health. A large systematic review and meta-analysis reported that there was no significant increase in psychiatric adverse events and that there were improvements in several measures of quality of life and eating behaviour reported in people receiving GLP-1 based therapies (Pierret *et al.*, 2025). Other recent reviews have suggested that GLP-1 signalling can also modulate neural pathways related to appetite, reward, motivation, and emotional regulation, but that these effects on the psyche have yet to be studied. It isn't, therefore, that GLP-1 drugs are psychological interventions, or that psychological issues are inconsequential to their use. Psychological outcomes should be taken into account, however, along with the metabolic outcomes, as alterations in appetite, eating behaviour, body image, expectations, motivation, and quality of life may affect treatment adherence and long-term behaviour. This is complemented by the evidence from Ochor's research in physical activity and psychological well-being which shows the correlation between physical activity and mental health outcomes. Likewise, the study by George and colleagues on emotional reactivity and perceived social support among Nigerian university students provides further support for the significance of psychosocial factors as part of the consideration of health-related behaviour. These studies are not direct evidence of GLP-1 effects, but rather add

weight to the case for assessing obesity treatment in the context of the psychological and social milieu in which health behaviour takes place.

3.3 Treatment Adherence and Social Support

Pharmacological efficacy is just one aspect of the effectiveness of treatment in the real world. The use of GLP-1 receptor agonists typically requires a long-term approach and stopping treatment may result in significant weight regain, so adherence and continuity of treatment are crucial. Treatment expectations, reduced appetite, gastrointestinal side effects, cost, and lack of availability and perceived burden due to taking medication over the long term may affect persistence. Among the key challenges that need clinical attention, recently a multidisciplinary advisory on nutrition management while taking GLP-1 therapy highlighted poor adherence after the period of treatment, weight regain after stopping treatment, gastrointestinal side effects, and high treatment costs. This puts compliance into the sphere of public health and not just individual compliance. Social support could be an extra pathway in which treatment can be maintained. In the study of social support and treatment-regimen adherence among emerging adults with mental illnesses, Isaiah *et al.*, (2026) argue that interpersonal support is important for sustaining adherence to treatment. Their findings do not directly apply to GLP-1 therapy, but do offer a conceptual framework to explore the role of family support, peer support, and healthcare-provider and structured behavioural support on medication persistence and lifestyle adaptation in patients taking anti-obesity medications. George *et al.*, 's research on perceived social support and emotional reactivity further supports the link between interpersonal/psychological environments and health behaviour. The implication for GLP-1 treatment is that, in and of itself, a treatment is not a treatment. Appropriate psychological support, nutritional counselling, guidance to exercise and easy follow-up may help to increase the long-term effectiveness of pharmacotherapy.

3.4 Exercise Adaptation and Lean Mass

Preserving lean mass while promoting rapid weight loss is one of the most critical unknowns with GLP-1 therapy. The loss of weight is generally a desirable effect if it represents the loss of excess adiposity, especially visceral fat; however, skeletal muscle plays important metabolic and functional roles. Systematic review and network meta-analysis of 22 RCTs in 2,258 participants showed body weight loss with GLP-1s, body fat loss, and body lean mass loss, with the latter accounting for about 25% of the total body weight loss (Karakasis *et al.*, 2025). This finding should not be interpreted as a sign of a negative effect of GLP-1 treatment on lean mass; relative lean mass can either be maintained or increased with decreasing total body mass. However, absolute losses in LT should be monitored, especially in older persons, in those with sarcopenic obesity, inactive population and in those with impaired

functional capacity. Current experts' recommendations, therefore, focus on balancing protein and nutrient intake with resistance and aerobic activity while on GLP-1.

Exercise should therefore be shifted away from being a lifestyle recommendation and more into the realm of an important part of the pharmacological treatment for obesity. The position can be supported from an interdisciplinary perspective by Ochor's work on the relationship between nutrition, biochemical processes and sports performance. Whether or not exercise can contribute to the loss of additional weight is not the only question, but whether it can help to maintain muscle mass, strength and physical function while pharmacotherapy effectively lowers adiposity. This separation establishes a new standard for assessing GLP-1 treatment, that of exercise adaptation.

3.5 Healthcare Access and Equity

Whether or not GLP-1 receptor agonists have population-health value will ultimately rely on their availability. A treatment doesn't necessarily have to be highly effective in clinical trials, but it must be highly effective for it to have a significant impact on the population level if individuals who are at risk for it can't afford, get or maintain it. Access may be impacted by cost, insurance coverage, availability, healthcare infrastructure, geographical inequalities, prescribing capacity and continuity of follow-up care. The evidence of disparities in obesity treatment over the last few years suggests that access and uptake is not even, and a focus on individuals with economic advantage may be associated with further inequalities in health if improvements in the treatment of obesity continue to be limited to this group of people (Ross *et al.*, 2025).

The issue is particularly pertinent in LMICs, where obesity is a challenge for health systems in addition to infectious diseases and undernutrition and other non-communicable diseases. The introduction of costly anti-obesity drugs thus poses questions of affordability, regulation, availability and clinical skills and integration with existing primary healthcare systems for Nigeria. Public health policy, therefore, should consider GLP-1 RAs in the context of an overall obesity policy instead of as a solution to the prevention, nutrition improvement, physical activity promotion and population-level interventions. The big, but not so big, question is: who gets to benefit from GLP-1 drugs? If we fail to make it a priority to be both cost-effective and accessible, the underlying burden of obesity in the population could remain largely unchanged despite the fact that we improve the health of people with the disease. If we don't pay particular attention to making products affordable and accessible, we can make all sorts of advances for the health of people with the disease, but we may do little for the burden of obesity on the population level.

3.6 The Biopsychosocial–Biochemical–Exercise–Equity (BBEE) Framework

The findings reported above align well with the proposed Biopsychosocial–Biochemical–Exercise–Equity (BBEE) framework of the broader effects of GLP-1 receptor agonists. The framework is not medication-based, where the only measurement of treatment success is how many kilograms of weight lost, but rather proposes a perspective of obesity management as a dynamic process between biological mechanisms, psychological processes and physical adaptation and social conditions. Biochemical domain reflects changes in glucose regulation, insulin signalling, lipid related risk, adiposity and other metabolic biomarkers. Psychological domain includes eating behaviour, emotional well-being, motivation, body image, quality of life and behavioural adaptation. The exercise domain is centered around physical activity, resistance training, maintaining lean mass, strength and functional capacity. The equity domain focusses on affordability, availability, health care infrastructure, and social support and continuity of care. These are not stand-alone domains – biochemical effects can benefit physical function; exercise can preserve lean tissue during weight loss; psychological support can enhance adherence; and sustained care is crucial for maintenance of clinical effects. Multidisciplinary recommendations in recent years also recommend that nutritional evaluation and monitoring of muscle and body composition, physical activity, mental-health evaluation and social determinants of health be included in the treatment of GLP-1.

The success of GLP-1 receptor agonists should therefore be evaluated based on the quality, sustainability and equity of health improvement and not just weight loss, as this is the central argument of this opinion paper. A patient who has lost a significant amount of weight, but is not being fed, not gaining muscle, not taking the medication, feels bad or cannot afford it may not have reached the optimal public health benefit. On the other hand, moderate weight loss with enhanced metabolic markers, maintenance of muscle, greater movement, better mental health and continued access to care might be a more meaningful treatment benefit. This approach also provides a 'roadmap' for future research. Body composition and functional measures should be routinely included in future GLP-1 studies in addition to weight, validated psychological and adherence outcomes should be included, future research should look at how GLP-1 affects exercise, and treatment access and socioeconomic characteristics should be reported. This would enable GLP-1 research to move beyond the predominantly weight-centred, pharmacological approach toward a more integrated approach to chronic-disease management, bridging the disciplines of biochemistry, clinical psychology, exercise science and public health. The framework is thus not meant to supplant good clinical measures of efficacy, but to expand on the concept of a meaningful treatment success.

4. DISCUSSION

The findings of this paper indicate that GLP-1 receptor agonists do not just have a public-health impact because they lower body weight. They have promising effects on appetite control, glucose regulation, adiposity and cardiovascular risk, suggesting their therapeutic promise in the treatment of the burden of obesity-related disease (Drucker, 2018; Lincoff *et al.*, 2023). But, the same evidence holds the more pertinent question of the quality and durability of weight loss. Lean mass in a clinical study has been decreased indicating that weight loss should be considered in conjunction with body composition and physical function (Mocciaro *et al.*, 2025). This is especially important as obesity and physical inactivity often go together and additional loss of muscle mass without sufficient exercise and nutrition may negatively impact strength and functional status of susceptible populations. This doesn't mean GLP-1 therapy should be avoided, but therapy should be part of a comprehensive approach to managing diabetes. Biochemical measures of improved glucose control and cardiometabolic risk are still relevant measures, but must be considered in addition to changes in adipose tissue, lean mass, nutritional status and functional health. These outcomes are increasingly focused on, as a transition from weight focused intervention to health focused obesity management is needed.

Psychological evidence also argues the other side of the GLP-1 therapy. There is no clear evidence for psychiatric adverse effects in general with the use of GLP-1 receptor agonists and some studies suggest that these medications have a beneficial effect on eating behaviour and quality-of-life (Pierret *et al.*, 2025). However, the lack of psychiatric damage doesn't mean that a person isn't going to need psychological care. However, behavioural and psychological mechanisms have to be taken into account in order to help identify factors that can contribute to obesity beyond those that are solely drug-related. While eating changes can be due to appetite reduction, motivation, self-regulation and supportive environments are needed to maintain healthy dietary patterns, physical activity and treatment engagement. Ochor's research into the connection between physical activity and psychological well-being is suggestive of the importance of physical activity as a part of the psychological dimension of health. Likewise, the study by George *et al.*, on emotional reactivity and perceived social support provides evidence of the importance of interpersonal and psychological aspects in health-related behaviour of the university students in Nigeria. This is in keeping with the idea that obesity treatment ought to take into account the person in a social environment and not be the passive target of pharmaceutical therapy. Therefore, psychological evaluation and counselling could be especially useful in determining unrealistic expectations, emotional eating, treatment satisfaction and treatment obstacles to sustained behaviour change.

Adherence is where the pharmacodynamics of a medication becomes a reality or is lost. While GLP-1 receptor agonists are typically used for long-term treatment, the effects of stopping treatment can lead to significant weight regain, indicating that obesity treatment can't be judged by the effects observed while the treatment is still being given. Adverse effects, cost of treatment, weight-loss availability, social factors, and social expectations for weight loss may be barriers to long term adherence. Some of these factors may be influenced by social support which can help encourage and assist with accountability and practical support. This is supported with relevant evidence provided by Isaiah *et al.*, (2026) who showed that social support plays a vital role in adhering to treatment regimen for mental illness in emerging adults. Their results do not provide direct evidence for GLP-1 medication adherence, but do contribute to the body of evidence that suggests that social support may be a factor that influences treatment persistence. The results of George *et al.*, on perceived social support support this, and indicate that interpersonal relationships can play a key role in behavioural health. This means for obesity management that adherence interventions should not only include the simple prescription of the medicine but also involve patient education, psychological support, family or peer support (where appropriate), nutritional counselling and regular clinical follow up. This is a method that would fit in with chronic disease management, in which long-term engagement is often more crucial than good initial treatment outcomes.

The effect of GLP-1 therapy on exercise adaptation is of special interest as this distorts the physical substrate on which exercise is performed. Some of the studies reported the loss of lean tissue, which is important to preserve skeletal muscle as a target of treatment, especially in older people and their subjects at risk of sarcopenia. Resistance exercise offers a feasible approach to maintaining muscle strength and function, and aerobic exercise to maintaining cardiovascular fitness and overall physical activity. It's not just about creating weight loss, however rather safeguarding function throughout weight reduction, which is the suitable role of exercise. This is in line with Ochor *et al.*, 's research showing a link between nutrition and biochemical markers of sport performance and recovery, but these findings cannot be directly applied to individuals with obesity. Overall, it is clear that closer ties between GLP-1 therapy and exercise science would help the treatment. Baseline levels of physical activity, muscle strength and functional capacity should be taken into consideration when developing clinical protocols, along with nutritional intake, and individualized exercise recommendations should be made (where clinically appropriate). Future studies should therefore investigate the changes in body weight and fat mass, as well as the response to resistance training, muscle strength, cardiorespiratory fitness, levels of physical activity and functional capacity. This would help clarify if exercise

could alter the body composition effects of the pharmacologic weight loss, and enhance the longer-term health benefits of treatment.

The public health/equity aspect is likely the most challenging areas in getting GLP-1 efficacy into population-level benefit. Access to GLP-1s is dependent on the income, insurance coverage, prescribing ability and health system infrastructure and is a relatively high cost option compared to many of the other proven pathways to obesity management. As a result, the groups that are suffering from the highest obesity-related disease burden might not also have the best resources to access the latest therapies. The presence of inequalities in obesity treatment access and utilization further supports the potential for obtaining similar or greater inequities in the future through the innovation of medicines for treatment (Ross *et al.*, 2025). In Nigeria and other LMICs obesity is a major concern given the scarcity of healthcare resources and its need to be combated alongside infectious disease (ID) and undernutrition as well as other non-communicable diseases (NCDs). A population-health approach, therefore, must not try to make GLP-1 a stand-in for obesity prevention, healthy food environments, physical-activity promotion and primary health care. Rather, medication should be used as part of a comprehensive obesity-control plan, which involves a team of health care providers. Cost-effectiveness, local disease burden and health care capacity as well as availability of medicines and potential consequences of differential access should be taken into account in public-health decision-making. This is because the measure of success is not just the number of patients who may benefit under optimal clinical circumstances, but how much effective obesity treatment can reach the population in need and be sustained.

The overall results corroborate the proposed Biopsychosocial–Biochemical–Exercise–Equity (BBEE) framework in this paper. The framework offers a means to link areas that are normally investigated individually. Biochemical changes determine if the drug is having the desired metabolic effect, psychological outcomes determine if the individual is adapting to the change in appetite, eating behaviours and body weight, exercise outcomes determine if there is maintenance of physical function and lean mass, adherence determines if benefits are maintained over time, and the equity dimension determines if benefits can be achieved at the population level. These domains are reinforcing to one another. Better metabolic health may support physical activity, optimal exercise can help maintain lean mass, psychological support can help increase treatment adherence and cost-effective health care can have a considerable impact on the ability to continue treatment. However, if the therapy fails to be successful in one area, the value of the therapy can be diminished. The BBEE framework thus goes beyond a pharmacological weight-loss intervention to a chronic-disease intervention. It also serves as a helpful framework for future investigations,

to ensure that investigators are reporting results from both the metabolic and psychological, functional, behavioural and access domains, rather than just the percentage weight change domain.

The overall message of this talk is that GLP-1 receptor agonists should not be seen as a "magic bullet" solution to the obesity epidemic nor be judged based on the constraints of pharmacologic treatment. While they are an important step forward in the treatment of obesity, their long-term public health impact will rely on their implementation with the nutrition, psychological, physical activity and exercise prescription and accessible long-term health care. This is especially relevant given the rising prevalence of overweight and obesity in the population of people who have various cultural, socioeconomic and healthcare situations. The value of Ochor and George's work is that these authors highlight the interrelatedness of nutrition, physical activity, psychological well-being and emotional factors and social supports in health-related behaviours and Isaiah *et al.*, (2026) provide focus on treatment adherence and social supports. These studies should not be considered as evidence specific to GLP-1, but they support the interdisciplinary argument of the current point of view. Finally, the central idea of going beyond the scale is acknowledging that the goal of obesity treatment is not simply to lose weight, but to achieve lasting improvements in metabolic health, psychological health, physical function, treatment engagement and treatment access and equity. This is a more relevant public health measure to determine the chronic impact of GLP-1 receptor agonists on obesity.

5. IMPLICATIONS FOR PRACTICE

The use of GLP-1 receptor agonists should not be as monotherapy for weight loss. Treatment efficacy should be assessed by monitoring metabolic parameters, body composition, nutritional status, psychological health, adherence to therapy, physical activity and functional capacity in clinical practice. Exercise specialists should stress appropriate prescribing of resistance and aerobic exercise to promote maintenance of lean mass, while psychologists, or other behavioural-health specialists, can work on treatment expectations, emotional eating, motivation and adherence. Social support may also be seen as a facilitator of continued treatment adherence (Isaiah *et al.*, 2026). The public health level needs explicit attention at which affordability, availability and continuity of treatment in the context of the use of pharmaceuticals need to be explicitly considered, to ensure that new medicines are not used disproportionately by higher income groups.

6. FUTURE RESEARCH DIRECTIONS

Future studies need to go beyond change in percentage weight loss to measure long term metabolic biomarkers, changes in fat and lean mass, psychological outcomes, exercise adaptation, and physical function and adherence to treatment. Future research is needed to

determine if structured resistance training, proper nutrition and psychological support can enhance the outcomes of GLP-1 treatment. The link between family and social support and medication persistence and lifestyle adaptation should also be investigated. Importantly, evidence from African populations is limited and further context specific evidence is needed that will include effectiveness and affordability, cultural acceptability, and health care capacity and equity. Future clinical trials should therefore be designed to include more than one discipline in outcome measurements, and should have a longer follow-up to assess if the benefits associated with GLP-1 are clinically significant following treatment continuation or discontinuation.

7. CONCLUSION

While GLP-1 receptor agonists have proven to be a significant breakthrough in obesity therapy, their impact goes beyond just weight reduction. Although their benefits on metabolic health and cardiovascular risk are promising, questions of lean-mass protection, psychological adaptation, adherence and equitable access continue to be of importance. This paper suggests that a larger picture measure of their public-health value is the Biopsychosocial–Biochemical–Exercise–Equity (BBEE) framework. The main idea behind this is straightforward: Good obesity treatments should result in improved health, not just reduced weight on a scale. A more sustainable strategy to tap into the efficacy of GLP-1 therapies to bring meaningful population-health benefits is likely to be achieved by integrating pharmacotherapy with psychological support, nutrition, exercise, and equitable healthcare access.

8. RECOMMENDATIONS

1. Healthcare providers must include doctors, dietitians, clinical psychologists and exercise specialists in obesity-management teams, to ensure patient metabolic health, psychological health, nutrition, physical activity, and adherence to treatment are monitored.
2. Baseline and follow-up evaluations of body composition and muscle function should be undertaken in patients taking GLP-1 receptor agonists, and resistance-exercise programmes and protein intake should be implemented as appropriate.
3. Routine care should include evaluation of treatment goals, eating patterns, motivation, emotional health and adherence challenges, and social support from family, peers, and/or professionals should be integrated to enhance long-term treatment adherence.
4. Strategies that make GLP-1 treatment affordable, covered by insurance, accessible for prescribing, and follow up should be developed by public health authorities and healthcare providers to ensure that it is not accessible only to higher income groups, especially in low- and middle-income countries.

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