ORIGINAL ARTICLE

Semaglutide for the Treatment of Obesity in Children 6 to <12 Years of Age

Ania M. Jastreboff, M.D., Ph.D.,[1-3] Nina M. Harder-Lauridsen, M.D., Ph.D.,[4] Michelle Van Name, M.D.,[5] Antje Körner, M.D., Ph.D.,[6-8] Aaron S. Kelly, Ph.D.,[9] Daniel Weghuber, M.D.,[10] Jens-Christian Holm, M.D., Ph.D.,[11,12] Christine Frithioff-Bøjsøe, M.D., Ph.D.,[4] Shilpa Middolu, M.Sc.,[13] Tina Buch, M.Sc.,[4] and Martin Wabitsch, M.D., Ph.D.,[14,15] for the STEP Young Investigators*

ABSTRACT

BACKGROUND

Childhood obesity is a chronic, neurometabolic disease with limited options for medical treatments that are efficacious and durable. Once-weekly subcutaneous semaglutide is approved for the treatment of obesity in adolescents and adults, but data for its use in young children are lacking.

METHODS

We conducted a phase 3, double-blind, randomized, placebo-controlled trial involving children (6 to <12 years of age) with obesity. Participants were randomly assigned in a 2:1 ratio to receive once-weekly subcutaneous semaglutide or placebo for a period of 104 weeks, after which participants stopped taking semaglutide or placebo for a 7-week washout period. Both groups received counseling for lifestyle modification. The primary end point was the percent change in the body-mass index (BMI; the weight in kilograms divided by the square of the height in meters) from baseline to week 68. The confirmatory secondary end point was a reduction in BMI category at week 68.

RESULTS

Among 167 children who underwent randomization, 112 were assigned to receive semaglutide and 55 to receive placebo. At week 68, the mean percent change in BMI was –13.5% with semaglutide and 2.7% with placebo (estimated between-group difference, –16.2 percentage points; 95% confidence interval [CI], –19.4 to –12.9; P<0.001). The percent change in BMI at week 104 was –9.4% with semaglutide and 8.4% with placebo (between-group difference, –17.8 percentage points; 95% CI, –22.2 to –13.3). At week 68, a reduction in BMI category had occurred in 79% of the participants in the semaglutide group and in 23% of those in the placebo group (odds ratio, 7.8; 95% CI, 3.5 to 17.6; P<0.001), with the BMI below the threshold for obesity (the 95th percentile for age and sex) in 38% of the participants who received semaglutide and in 2% of those who received placebo. Adverse events occurred in 96% of the participants receiving semaglutide and in 93% of those receiving placebo. Gastrointestinal adverse events were the most common, occurred more frequently with semaglutide than with placebo, and led to discontinuation in 1 participant in the semaglutide group.

CONCLUSIONS

Among children (6 to <12 years of age) with obesity, treatment with semaglutide for 68 weeks resulted in a significantly greater mean percent reduction in BMI than placebo. (Funded by Novo Nordisk; STEP Young ClinicalTrials.gov number, NCT05726227.)

Author affiliations are listed at the end of the article. Ania M. Jastreboff can be contacted at Yale School of Medicine, Endocrinology and Metabolism, 333 Cedar St., New Haven, CT 06520.

*A complete list of the STEP Young investigators is provided in the Supplementary Appendix, available at NEJM.org.

This article was published on November 16, 2026, at NEJM.org.

DOI: 10.1056/NEJMoa2604058

Copyright © 2026 Massachusetts Medical Society.

The New England Journal of Medicine is produced by NEJM Group, a division of the Massachusetts Medical Society.
Downloaded from nejm.org by heydar dolati on November 20, 2026.

More than 200 million school-age children worldwide are living with obesity, including one in five children 6 to 11 years of age in the United States.[1] Childhood obesity may have both immediate and enduring effects on health,[2] increasing the risk of multiple obesity-related complications, which emerge early, even among school-age children.[3] These complications not only include cardiometabolic diseases[2,4-6] but also may affect psychosocial health and a child's potential to thrive.[2,3,7,8] Complications of obesity that emerge in childhood may intensify rapidly in early adulthood[6] and may shorten life expectancy substantially.[9]

Currently available treatments for children younger than 12 years of age are limited mainly to lifestyle modifications, with rare exceptions of off-label pharmacotherapy and bariatric surgery for children with severe obesity.[2,10-12] Although lifestyle modifications are a central part of obesity management and support overall health, associated reductions in the body-mass index (BMI; the weight in kilograms divided by the square of the height in meters) are modest (−0.7), with limited evidence for durability.[2,13] Thus, the need for more effective treatments is leading to investigation of pharmacotherapeutic options for children.

Although three medications have been approved by the Food and Drug Administration (FDA) for the treatment of adolescents with obesity, and two have been approved by the European Medicines Agency (EMA),[14-16] only one medication (liraglutide) is currently approved for the treatment of nonsyndromic, nonmonogenic obesity in children (6 to <12 years of age) in the European Union, and none have been approved in the United States.[17,18] According to clinical practice guidelines from the American Academy of Pediatrics, health care professionals "should offer" pharmacotherapy for adolescents (≥12 years of age) with obesity and "may offer" pharmacotherapy for younger children with obesity "according to medication indications, risks, and benefits," with the possibility that "new evidence may lead to additional options for children younger than 12 years in the future."[2] Canadian pediatric practice guidelines include similar recommendations.[13] We conducted the phase 3 STEP (Semaglutide Treatment Effect in People with Obesity) Young trial to investigate the safety and efficacy of once-weekly subcutaneous semaglutide, a glucagon-like peptide-1 (GLP-1) receptor agonist, for the treatment of obesity in children and adolescents; here, we report the results for children (6 to <12 years of age).

METHODS

TRIAL DESIGN

We conducted this phase 3, double-blind, randomized, placebo-controlled trial at 48 sites in nine countries. The trial was conducted in accordance with the principles of the Declaration of Helsinki, the guidelines for Good Clinical Practice from the International Council for Harmonisation, and all applicable laws and regulations. The trial protocol (available with the full text of this article at NEJM.org) and amendments were approved by the institutional review board or independent ethics committee at each site. Details about trial oversight and author responsibilities are provided in the Supplementary Appendix, available at NEJM.org.

PARTICIPANTS

Participants were children (6 to <12 years of age) with obesity, defined as an age- and sex-adjusted BMI that was at or above the 95th percentile according to the clinical growth charts from the Centers for Disease Control and Prevention.[19] According to the protocol, at least 30% of the children enrolled in the trial had to have severe obesity, defined as a BMI that was at least 120% of the 95th percentile for age and sex or the presence of an obesity-related complication (hypertension, dyslipidemia, obstructive sleep apnea, or type 2 diabetes). Participants who had previous or planned bariatric surgery or who had syndromic or hypothalamic obesity were excluded (monogenic obesity was permitted). Full eligibility criteria are listed in the Supplementary Appendix. Written informed consent from caregivers and informed assent from participants were obtained.

PROCEDURES

Participants were randomly assigned in a 2:1 ratio (with stratification according to sex and Tanner stage [1 through 5, with higher stages indicating more advanced pubertal development]) to receive once-weekly subcutaneous semaglutide or placebo. The maximum dose of semaglutide was 2.4 mg for participants with a body weight above 60 kg at baseline, 1.7 mg for those with a body weight of 45 to 60 kg at baseline, or the maximum tolerated dose (Fig. S1 in the Supplementary Appendix). The treatment period was 104 weeks (in-

The New England Journal of Medicine is produced by NEJM Group, a division of the Massachusetts Medical Society.
Downloaded from nejm.org by heydar dolati on November 20, 2026.

cluding 16 weeks of dose escalation) and was followed by a 7-week washout period during which the participants did not receive semaglutide or placebo. All the participants received multidisciplinary counseling for lifestyle modification delivered by a dietitian or a qualified health care professional, which was continued during the 7-week washout period (see the Supplementary Appendix and the protocol).

END POINTS AND ASSESSMENTS

The primary end point was the percent change in BMI from baseline to week 68, and the key confirmatory secondary end point was a reduction in BMI category from baseline to week 68. Supportive secondary end points included the percent change in BMI and a reduction in BMI category from baseline to week 104. Additional supportive end points included changes from baseline in body weight–related measures (the percent change and the absolute change in body weight, the change in BMI as a percentage of the 95th percentile for a given age and sex, the change in the BMI standard-deviation score [calculated with the use of growth reference data for children and adolescents 5 to 19 years of age from the World Health Organization[20]], and reductions in BMI of ≥5%, ≥10%, ≥15%, and ≥20%) at weeks 68 and 104, changes in cardiometabolic measures (waist circumference, blood pressure, and levels of lipids, high-sensitivity C-reactive protein, glycated hemoglobin, fasting plasma glucose, fasting serum insulin, and alanine aminotransferase) from baseline to weeks 68 and 104, and changes from baseline in fat mass and in lean soft-tissue mass (assessed by dual-energy x-ray absorptiometry [DXA] relative to total body mass and as absolute changes expressed in kilograms) in a subgroup of participants at weeks 68 and 104. The BMI category was defined on the basis of sex- and age-specific growth charts according to the criteria of the Centers for Disease Control and Prevention (normal or healthy weight, 5th percentile to <85th percentile; overweight, 85th percentile to <95th percentile; obesity class 1, 95% to <120% of the 95th percentile; obesity class 2, 120% to <140% of the 95th percentile; and obesity class 3, ≥140% of the 95th percentile).[2,21] A complete list of supportive secondary end points is provided in the Supplementary Appendix.

Safety assessments included adverse events and serious adverse events reported during the treatment or washout period. Additional safety assessments included height-related changes (the absolute gain in height, mean annual height velocity, and changes in the height standard-deviation score) and changes in bone age, bone-mineral density (as assessed by DXA), pulse, and levels of amylase, lipase, and calcitonin.

STATISTICAL ANALYSIS

We estimated that a sample of 165 participants randomly assigned in a 2:1 ratio would provide the trial with at least 80% power to detect a between-group difference of –7.7 percentage points in the percent change in BMI from baseline to week 68 with semaglutide as compared with placebo. For this calculation, we assumed that the standard deviation would be 10.0 in the semaglutide group and 8.0 in the placebo group and that the percentage of participants with a reduction in BMI category would be 75% and 35%, respectively. Analyses were conducted with the treatment-regimen estimand, which assessed effects regardless of discontinuation of semaglutide or placebo or the initiation of rescue therapy (other obesity medications or bariatric surgery), and the hypothetical efficacy estimand, which assessed effects under the assumption that all the participants received semaglutide or placebo as intended (details are provided in Table S1 and in the Statistical Analysis section in the Supplementary Appendix). Efficacy end points were assessed in the full analysis population, which included all the participants who underwent randomization, and safety end points were assessed in the safety analysis population, which included all the participants who underwent randomization and received at least one dose of semaglutide or placebo.

Estimated between-group differences are presented with two-sided 95% confidence intervals and P values. The primary and confirmatory secondary end points were evaluated with a prespecified hierarchical testing strategy. Additional end points were analyzed without adjustment for multiplicity; thus, these end points should not be used to infer definitive treatment effects. For the treatment-regimen estimand, continuous end points were assessed with analysis of covariance, and categorical end points were analyzed with logistic regression with the assigned trial product (semaglutide or placebo) and stratification variables (sex and Tanner stage) as factors

The New England Journal of Medicine is produced by NEJM Group, a division of the Massachusetts Medical Society.
Downloaded from nejm.org by heydar dolati on November 20, 2026.

and the baseline value as covariate. The efficacy estimand was analyzed with a mixed model for repeated measures with the assigned trial product as a factor and the baseline value as covariate. A multiple-imputation method was used for missing values. For the changes in pulse, bone mineral density, and levels of amylase, lipase, and calcitonin, a mixed model for repeated measures was used. Adverse events were summarized descriptively. The full statistical analysis plan is available with the protocol.

RESULTS

PARTICIPANTS

A total of 178 children underwent screening, and 167 underwent randomization, with 112 assigned to receive semaglutide and 55 to receive placebo (Table 1). The trial began in July 2023; in October 2025, all the participants had reached the time point for the primary end point (week 68); the end of the treatment period (week 104) was reached in May 2026; and the end of the 7-week washout period (week 111) was reached in July 2026. The database was locked on August 14, 2026, and unblinding was performed the same day.

Overall, 148 participants (89%; 100 [89%] in the semaglutide group and 48 [87%] in the placebo group) completed the trial through week 68 (the time point for assessment of the primary end point), and 135 participants (81%; 94 [84%] in the semaglutide group and 41 [75%] in the placebo group) completed the trial through week 111 (the end of the washout period) (Fig. S2). A total of 129 participants (77%; 94 [84%] in the semaglutide group and 35 [64%] in the placebo group) received semaglutide or placebo as assigned through week 68, and 121 participants (72%; 87 [78%] in the semaglutide group and 34 [62%] in the placebo group) received semaglutide or placebo as assigned through week 104 (the end of the treatment period). The doses of semaglutide and placebo varied at the end of the treatment period (Fig. S3). At week 68, discontinuation of semaglutide or placebo due to adverse events had occurred in 3% of the participants in the semaglutide group and in no participants in the placebo group; by week 111 (the end of the washout period), discontinuation had occurred in 4% of the participants in the semaglutide group and in 2% of those in the placebo group.

The demographic and clinical characteristics of the participants at baseline were mostly similar in the two groups (Table 1 and Fig. S4). The mean age of the participants was 10 years, and 59% were girls. Most participants were at Tanner stage 1 at baseline, and most participants (more than 85%) had class 2 or 3 obesity (Table 1). Numbers of participants who initiated other obesity medications during the trial are shown in Table S2, and the representativeness of the trial population is summarized in Table S3.

BODY WEIGHT–RELATED END POINTS

At week 68, the estimated percent change from baseline in BMI for the treatment-regimen estimand was –13.5% with semaglutide and 2.7% with placebo; the estimated between-group difference was –16.2 percentage points (95% confidence interval [CI], –19.4 to –12.9; P<0.001) (Fig. 1A and Table 2). The estimated percent change from baseline in BMI for the efficacy estimand was –17.4% with semaglutide and 2.2% with placebo (between-group difference, –19.7 percentage points) (Fig. 1A, Fig. S5, and Table S4). At week 104, the estimated percent change from baseline in BMI for the treatment-regimen estimand was –9.4% with semaglutide and 8.4% with placebo (between-group difference, –17.8 percentage points) (Table 2 and Fig. S6); for the efficacy estimand, the values were –14.0% and 5.7%, respectively (between-group difference, –19.6 percentage points).

A reduction in BMI category at week 68 was observed in 79% of the participants who received semaglutide and in 23% of those who received placebo (odds ratio, 7.8 [95% CI, 3.5 to 17.6; P<0.001]; risk ratio, 3.0 [95% CI, 1.7 to 5.4]), and a reduction at week 104 was observed in 77% and in 24%, respectively (odds ratio, 8.2 [95% CI, 3.4 to 19.4]; risk ratio, 3.3 [95% CI, 1.8 to 6.3]) (Table S5). A reduction in BMI to a level below the threshold for obesity (the 95th percentile for age and sex) was observed in 38% of the participants in the semaglutide group and in 2% of those in the placebo group at week 68 and in 33% and 2%, respectively, at week 104 (Fig. 1B and Fig. S7). A total of 75% of the participants in the semaglutide group had reached a threshold of BMI reduction of at least 10% at week 68, as compared with 4% of those in the placebo group, and 64% of the participants in the semaglutide group and none of those in the placebo group had a reduction of at least 10% at week 104. Observed re-

The New England Journal of Medicine is produced by NEJM Group, a division of the Massachusetts Medical Society.
Downloaded from nejm.org by heydar dolati on November 20, 2026.

Table 1. Characteristics of the Participants at Baseline.*

Characteristic	Semaglutide (N=112)	Placebo (N=55)
Age — yr	10±1	10±1
Sex — no. (%)		
Female	66 (59)	32 (58)
Male	46 (41)	23 (42)
Race or ethnic group — no. (%)†		
Asian	1 (1)	0
Black	10 (9)	3 (5)
White	82 (73)	40 (73)
Not reported	15 (13)	11 (20)
Other	4 (4)	1 (2)
Hispanic or Latino ethnic group — no. (%)†	8 (7)	4 (7)
Tanner stage — no. (%)‡		
1	68 (61)	30 (55)
2 or 3	39 (35)	23 (42)
4 or 5	5 (4)	2 (4)
Body weight — kg	71.7±16.7	72.2±17.2
BMI§		
Mean	32.4±5.3	32.5±5.7
Percentage of the 95th percentile	145.2±24.4	143.1±25.0
Standard-deviation score	4.2±1.4	4.0±1.3
Obesity class — no. (%)¶		
1	12 (11)	11 (20)
2	38 (34)	15 (27)
3	62 (55)	29 (53)
Waist-to-height ratio	0.7±0.1	0.7±0.1
Blood pressure — mm Hg		
Systolic	114±12	115±12
Diastolic	70±11	68±11
Pulse — beats/min	85±14	89±14
No. of obesity-related complications at screening — no. (%)‖		
0	52 (46)	29 (53)
1	36 (32)	20 (36)
2	12 (11)	6 (11)
≥3	12 (11)	0
Glycated hemoglobin level — %	5.5±0.2	5.5±0.2

* Plus–minus values are means ±SD. Percentages may not total 100 because of rounding. Data on the waist-to-height ratio were available for 112 participants in the semaglutide group and for 53 participants in the placebo group, and data on the glycated hemoglobin level for 109 and 55, respectively.

† Race and ethnic group were reported by the participants or caregivers. The category "other" includes American Indian or Alaska Native and multiple.

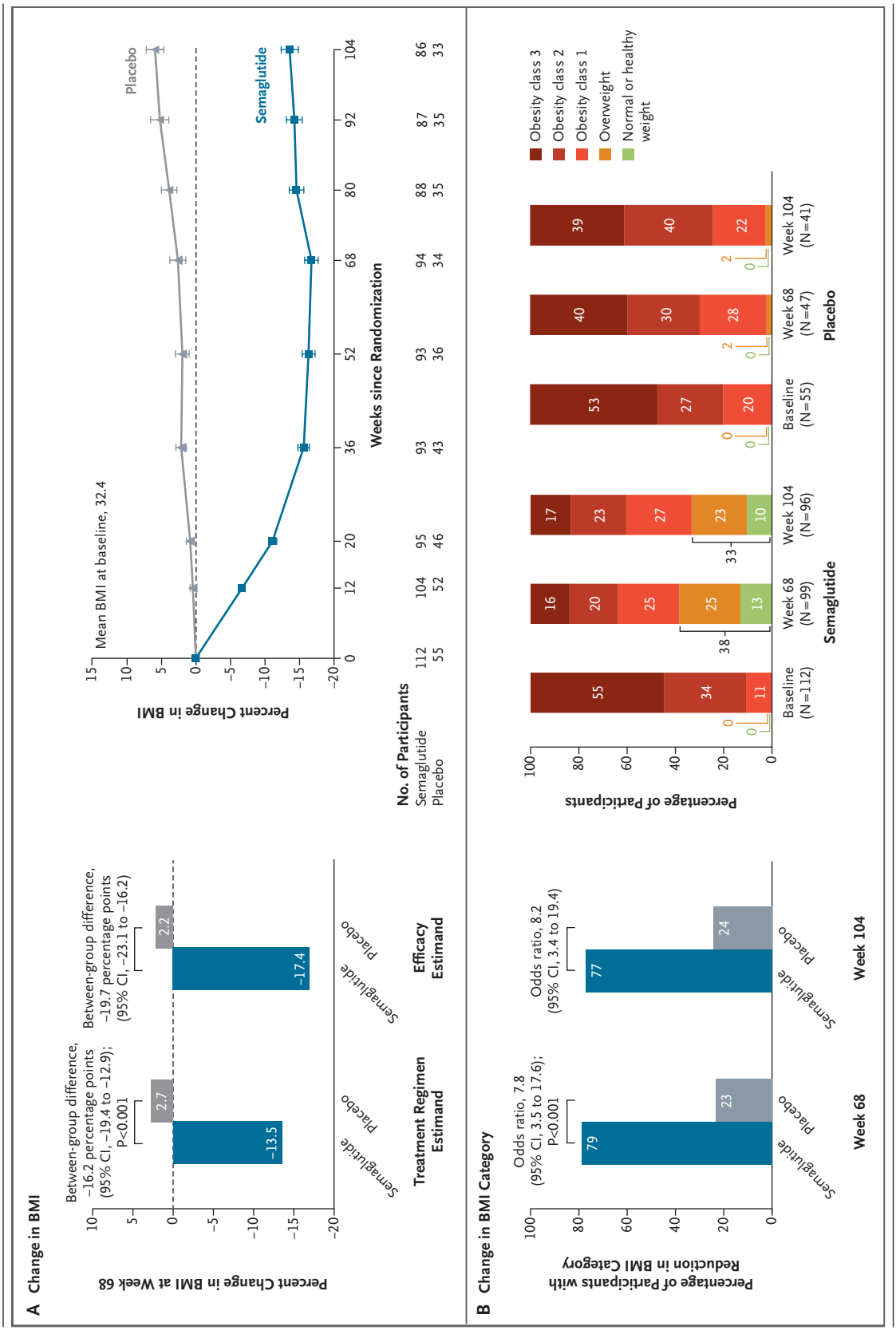
‡ Tanner stages are defined according to breast development for girls and genital development for boys. Tanner stages range from 1 to 5, with higher stages indicating more advanced pubertal development.

§ Percentiles of body-mass index (BMI; the weight in kilograms divided by the square of the height in meters) were assessed on the basis of sex- and age-specific growth charts from the Centers for Disease Control and Prevention (CDC).[19,22] The BMI standard-deviation scores were calculated with the use of growth reference data for children and adolescents (5 to 19 years of age) from the World Health Organization.[20]

¶ Obesity class was defined by BMI according to the criteria of the CDC (class 1, 95% to <120% of the 95th percentile; class 2, 120% to <140% of the 95th percentile; and class 3, ≥140% of the 95th percentile).[2,21]

‖ Complications included asthma (in 13% of the participants), dyslipidemia (in 13%), hypertension (in 4%), liver disease (in 15%), obstructive sleep apnea syndrome (in 3%), and glucose metabolism disorders (prediabetes, impaired glucose tolerance, impaired fasting glucose levels, elevated glycated hemoglobin levels, insulin resistance, or insulin sensitivity; in 20%), as reported by the investigator on the basis of the participant's medical history.

The New England Journal of Medicine is produced by NEJM Group, a division of the Massachusetts Medical Society.
Downloaded from nejm.org by heydar dolati on November 20, 2026.



The New England Journal of Medicine is produced by NEJM Group, a division of the Massachusetts Medical Society.
Downloaded from nejm.org by heydar dolati on November 20, 2026.

Figure 1 (facing page). Changes in BMI at Weeks 68 and 104.

Data are shown for the full analysis population, which included all the participants who underwent randomization. Panel A shows mean percent changes from baseline in the body-mass index (BMI; the weight in kilograms divided by the square of the height in meters). The graph on the left shows estimated mean changes at week 68 for the treatment-regimen estimand and the hypothetical efficacy estimand; the graph on the right shows observed mean percent changes over time from randomization to week 104 for the hypothetical on-treatment period (the time from the first dose of semaglutide or placebo to 14 days after the last dose, excluding any intervals with at least two consecutive missed doses). Numbers below the x axis in the graph on the right are numbers of participants included in the calculation of the mean. I bars indicate standard errors. The primary and secondary confirmatory end points (the percent change in BMI and a reduction in BMI category from baseline to week 68, respectively) were controlled for multiplicity. In Panel B, the graph on the left shows the percentages of participants who had a reduction in BMI category at week 68 and at week 104 for the in-trial observation period (the time from randomization to the last contact with a trial site), as calculated with the treatment-regimen estimand; observed percentages of participants within each BMI category at baseline, week 68, and week 104 for the in-trial period are shown to the right. BMI category was defined on the basis of sex- and age-specific growth charts according to the criteria of the Centers for Disease Control and Prevention (normal or healthy weight, 5th percentile to <85th percentile; overweight, 85th percentile to <95th percentile; obesity class 1, 95% to <120% of the 95th percentile; obesity class 2, 120% to <140% of the 95th percentile; and obesity class 3, ≥140% of the 95th percentile).[2,21] Percentages may not total 100 because of rounding.

sults for BMI-reduction thresholds of at least 5% to at least 20% are shown in Table 2, Table S4, and Figure S8. Results for other secondary end points related to BMI are shown in Table 2, Table S4, and Figures S9 through S12.

BODY COMPOSITION

A subgroup of 50 participants underwent DXA for analysis of changes in body composition. For the treatment-regimen estimand, the between-group difference in the change in fat mass as a percentage of total body mass from baseline to week 68 was −5.3 percentage points, and the between-group difference in lean soft-tissue mass as a percentage of total body mass at week 68 was 5.0 percentage points; the corresponding values at week 104 were −3.1 percentage points and 2.9 percentage points. At week 68, the participants in the semaglutide group had a mean absolute gain in lean soft tissue of 3.1 kg, as compared with 5.3 kg in the placebo group, and the mean absolute gain at week 104 was 6.6 kg, as compared with 9.1 kg, respectively (Table 2). Results for the efficacy estimand are shown in Table S4.

HEIGHT AND GROWTH

The median height among the participants at baseline was 148.0 cm in the semaglutide group and 149.3 cm in the placebo group. The median gain in height was 5.7 cm with semaglutide and 7.8 cm with placebo at week 68 and 8.8 cm and 12.1 cm, respectively, at week 104. The mean annual height velocity was also lower and decreases in the height standard-deviation score were greater with semaglutide than with placebo (Table S6). Changes in bone age, bone mineral density as assessed by DXA, and observed Tanner-stage distributions were similar in the two trial groups (Tables S6 and S7).

CARDIOMETABOLIC MEASURES

At 68 weeks, the mean change in waist circumference was −8.5 cm in the semaglutide group and 2.7 cm in the placebo group; for systolic blood pressure, the mean change was −4.4 mm Hg and −0.9 mm Hg, respectively; for the glycated hemoglobin level, −0.2 percentage points and 0.0 percentage points; for the triglyceride level, −26.3% and 0.4%; and for the level of high-sensitivity C-reactive protein, −68.3% and −14.4% (Fig. 2, Table 2, Fig. S13, and Table S4). In a prespecified exploratory analysis, reversion of prediabetes (glycated hemoglobin, ≥5.7%) to normoglycemia (glycated hemoglobin, <5.7%) at week 68 was observed in 93% of the participants in the semaglutide group and in 56% of those in the placebo group; the corresponding values at week 104 were 94% and 44% (Fig. S14).

SAFETY

From baseline to week 111, adverse events were reported in 108 of 112 participants (96%) in the semaglutide group and in 51 of 55 participants (93%) in the placebo group (Table 3). Adverse events led to discontinuation of the trial regimen in 4 participants (4%) in the semaglutide group and in 1 participant (2%) in the placebo group. The most common adverse events were gastrointestinal (including vomiting, diarrhea,

The New England Journal of Medicine is produced by NEJM Group, a division of the Massachusetts Medical Society.
Downloaded from nejm.org by heydar dolati on November 20, 2026.

Table 2. Primary and Secondary End Points (Treatment-Regimen Estimand).*

End Point	At Week 68			At Week 104		
	Semaglutide (N=112)	Placebo (N=55)	Difference (95% CI)†	Semaglutide (N=112)	Placebo (N=55)	Difference (95% CI)†
Primary end point						
Percent change in BMI‡	−13.5	2.7	−16.2 (−19.4 to −12.9)§	−9.4	8.4	−17.8 (−22.2 to −13.3)
Key secondary end point						
Reduction in BMI category — no./total no. (%)‡¶	78/99 (79)	11/47 (23)	7.8 (3.5 to 17.6)§	74/96 (77)	10/41 (24)	8.2 (3.4 to 19.4)
Supportive secondary end points						
Change in BMI as percentage of 95th percentile — percentage points‖	−25.5	−4.6	−21.0 (−25.4 to −16.6)	−24.3	−2.1	−22.2 (−28.1 to −16.4)
Change in BMI standard-deviation score**	−1.3	−0.4	−0.9 (−1.1 to −0.7)	−1.3	−0.4	−0.9 (−1.2 to −0.7)
BMI reduction threshold — no./total no. (%)¶						
≥5% reduction	83/99 (84)	6/47 (13)	20.3 (7.7 to 53.0)	71/96 (74)	1/41 (2)	67.4 (8.3 to 545.9)
≥10% reduction	74/99 (75)	2/47 (4)	45.4 (10.1 to 204.1)	61/96 (64)	0	88.7 (20.2 to 389.5)
≥15% reduction	62/99 (63)	0	111.4 (34.7 to 357.4)	39/96 (41)	0	45.6 (13.0 to 159.8)
≥20% reduction	37/99 (37)	0	48.5 (20.5 to 114.4)	27/96 (28)	0	29.2 (10.1 to 84.4)
Change in body weight						
Relative change — %	−6.4	13.6	−20.0 (−23.9 to −16.1)	3.5	25.8	−22.3 (−27.8 to −16.8)
Absolute change — kg	−4.3	9.2	−13.5 (−16.1 to −10.9)	2.5	17.6	−15.2 (−19.1 to −11.3)
Change in total fat mass relative to total body mass — percentage points††	−5.8	−0.5	−5.3 (−7.9 to −2.6)	−3.5	−0.4	−3.1 (−5.6 to −0.5)
Change in lean soft-tissue mass relative to total body mass — percentage points††	5.4	0.4	5.0 (2.5 to 7.6)	3.3	0.4	2.9 (0.5 to 5.3)
Change in total fat mass — kg††	−3.1	4.5	−7.5 (−11.3 to −3.8)	2.3	8.0	−5.6 (−9.8 to −1.5)
Change in lean soft-tissue mass — kg††	3.1	5.3	−2.2 (−4.3 to −0.1)	6.6	9.1	−2.5 (−5.3 to 0.3)
Change in waist-to-height ratio	−0.1	−0.0	−0.1 (−0.1 to 0.0)	−0.1	−0.0	−0.1 (−0.1 to 0.0)
Change in waist circumference — cm	−8.5	2.7	−11.2 (−15.2 to −7.2)	−5.0	7.3	−12.4 (−16.4 to −8.3)
Change in blood pressure — mm Hg						
Systolic	−4.4	−0.9	−3.4 (−7.6 to 0.8)	−2.0	1.2	−3.2 (−11.2 to 4.9)
Diastolic	−3.0	0.5	−3.4 (−7.4 to 0.6)	−0.2	−1.9	1.7 (−4.2 to 7.6)
Percent change in hsCRP level‡‡	−68.3	−14.4	−63.0 (−75.5 to −44.2)	−68.3	−13.0	−63.6 (−85.3 to −10.2)

The New England Journal of Medicine is produced by NEJM Group, a division of the Massachusetts Medical Society.
Downloaded from nejm.org by heydar dolati on November 20, 2026.

Change in glycated hemoglobin level — percentage points	−0.2	0.0	−0.2 (−0.3 to −0.2)	−0.2	0.0	−0.2 (−0.3 to −0.1)
Change in fasting plasma glucose level — mg/dl	−3.2	−0.5	−2.7 (−6.0 to 0.6)	−1.1	−0.2	−0.9 (−5.3 to 3.5)
Percent change in fasting serum insulin level	−19.9	22.5	−42.4 (−73.2 to −11.6)	−6.0	46.0	−52.0 (−138.5 to 34.4)
Percent change in lipid levels‡‡						
Total cholesterol	−3.5	−2.8	−0.7 (−5.5 to 4.1)	−5.3	−1.2	−4.1 (−14.1 to 5.9)
HDL cholesterol	12.8	4.7	8.1 (1.7 to 14.5)	9.9	2.5	7.4 (−0.2 to 15.0)
LDL cholesterol	−3.7	−6.0	2.3 (−4.6 to 9.2)	−6.4	−1.4	−5.0 (−19.8 to 9.9)
VLDL cholesterol	−26.2	0.4	−26.6 (−43.3 to −9.9)	−24.5	7.5	−31.9 (−61.5 to −2.4)
Triglycerides	−26.3	0.4	−26.7 (−43.4 to −10.1)	−24.1	7.5	−31.6 (−61.7 to −1.5)
Percent change in ALT level‡‡	−27.0	−13.4	−15.7 (−28.4 to −0.7)	−26.8	−20.5	−7.9 (−28.3 to 18.2)

* Shown are estimated mean changes from baseline for the full analysis population as calculated with the treatment-regimen estimand, which was used to assess treatment efficacy in all the participants who underwent randomization, regardless of adherence to the assigned regimen or the use of rescue therapy (obesity medication or bariatric surgery), unless otherwise noted. The analyses were performed on the basis of data from the in-trial observation period (the time from randomization to the last contact with a trial site). Continuous end points were assessed with the use of analysis of covariance, with trial group and stratification variables (sex and Tanner stage at baseline) as factors and the baseline value as a covariate; categorical end points were analyzed with the use of logistic regression, with the same factors and covariate. A multiple-imputation approach was used for missing data. Missing observations were imputed with multiple imputation (1000 imputations) with the use of data from retrieved participants in the same trial group. Multiplicity was controlled across the primary and secondary confirmatory end points. Consequently, the 95% confidence intervals for supportive secondary end points should not be used for inferential conclusion. Corresponding data for the efficacy estimand are shown in Table S4. To convert the values for glucose to millimoles per liter, multiply by 0.05551. ALT denotes alanine aminotransferase, HDL high-density lipoprotein, hsCRP high-sensitivity C-reactive protein, LDL low-density lipoprotein, and VLDL very-low-density lipoprotein.

† Data are the absolute differences between the estimated mean changes unless otherwise noted. Differences for end points expressed as percentages are given in percentage points.

‡ The change from baseline to week 104 was a supportive secondary end point.

§ P<0.001.

¶ Data are the observed numbers and percentages of participants at week 68 or week 104, as specified, for the in-trial period, and the differences are the estimated odds ratios for the treatment-regimen estimand.

‖ BMI percentiles were assessed on the basis of sex- and age-specific growth charts from the CDC.[19,22]

** BMI standard-deviation scores were calculated with the use of growth reference data for children and adolescents (5 to 19 years of age) from the World Health Organization.[20]

†† Data are shown for the subgroup of participants who underwent dual-energy x-ray absorptiometry (30 in the semaglutide group and 20 in the placebo group). Details about analyses of body composition are provided in the Supplementary Appendix.

‡‡ Levels were initially analyzed on a log scale as an estimated ratio to the baseline value (within trial groups) and as an estimated ratio to the value in the other trial group. For interpretation, the ratios to the baseline value are expressed as percent changes, and the ratios between the trial groups are expressed as estimated between-group differences, given in percentage points. Percent changes were calculated as follows: (estimated ratio − 1) × 100.

The New England Journal of Medicine is produced by NEJM Group, a division of the Massachusetts Medical Society. Downloaded from nejm.org by heydar dolati on November 20, 2026.

nausea, and abdominal pain), were mainly mild to moderate in severity and transient, and occurred more frequently during dose escalation than during other time periods and more frequently with semaglutide than with placebo (Table 3, Table S8, and Fig. S15). At week 111, vomiting had occurred in 70% of the participants in the semaglutide group and in 29% of those in the placebo group; diarrhea in 62% and 35%, respectively; and nausea in 58% and 24%. In the semaglutide group, 1 participant discontinued treatment before week 68 owing to gastrointestinal adverse events; at week 111, no further discontinuations due to gastrointestinal events had occurred. No participants in the placebo group discontinued placebo owing to gastrointestinal adverse events.

At week 111, serious adverse events, mainly respiratory tract or gastrointestinal infections, had been reported in 10 participants (9%) in the semaglutide group and in 5 participants (9%) in the placebo group. One serious adverse event in each group was gastrointestinal. No fatal events occurred, and no new safety concerns were detected.

Psychiatric events (mental health symptoms and diagnoses) were reported in 23 participants (21%) in the semaglutide group and in 13 participants (24%) in the placebo group. Investigator-initiated referrals to mental health professionals, on the basis of child- or caregiver-reported changes in mood, behavior, or school performance, were reported in 9 participants (8%) in the semaglutide group and in 8 participants (15%) in the placebo group (Table S9). Changes in pulse and laboratory safety measures are shown in Table S10. Data for adverse events of special interest are shown in Table S11.

DISCUSSION

In this phase 3 trial involving children (6 to <12 years of age), treatment with once-weekly subcutaneous semaglutide as compared with placebo resulted in a mean between-group difference in the change in BMI at 68 weeks of –16.2 percentage points for the treatment-regimen estimand and –19.7 percentage points for the efficacy estimand; the between-group difference at 104 weeks was –17.8 percentage points and –19.6 percentage points, respectively. Cardiometabolic measures were prespecified end points but were not included in the plan to adjust for multiple testing, and therefore, no definitive conclusions can be drawn; however, greater reductions in measures of cardiometabolic risk were observed with semaglutide than with placebo. The most commonly reported side effects with semaglutide were gastrointestinal, and one participant discontinued treatment before week 68 owing to gastrointestinal events.

Lifestyle modifications have historically been central to the treatment of obesity in children, but weight loss and other effects have been generally modest, and evidence for long-term durability remains limited.[2,13] Bariatric surgery has been used as a treatment for obesity in adolescents 13 years of age or older,[2] in small numbers of children at least 10 years of age,[12] and, in very rare instances, in younger children with severe obesity.[10,11]

Approved medications for childhood obesity are limited to adolescents at least 12 years of age,[14-16] except liraglutide, which is approved for use in children 6 years of age or older in the European Union.[23] In a trial involving children (6 to <12 years of age), 56 weeks of treatment with once-daily subcutaneous liraglutide, a GLP-1 receptor agonist, led to a reduction in BMI that was 7.4 percentage points greater than that with placebo.[24] Semaglutide, a long-acting GLP-1 receptor agonist, is approved by the FDA and EMA for once-weekly subcutaneous administration in adolescents with obesity who are at least 12 years of age.[25,26] In the STEP TEENS trial involving adolescents, treatment with semaglutide over a period of 68 weeks resulted in a mean percent change in BMI of –16.1%, as compared with 0.6% with placebo, a difference of –16.7 percentage points.[14] In a prespecified secondary analysis of that trial, semaglutide decreased BMI below the threshold for obesity (the 95th percentile for BMI for age and sex) in 42.3% of the participants, as compared with 12.9% of those in the placebo group.[27] The present trial showed similar benefits in children who were 6 to less than 12 years of age. In this trial, more than 85% of the participants had severe obesity (class 2 or 3)[21] at baseline. At 68 weeks, BMI had decreased below the threshold for obesity in 38% of the participants in the semaglutide group, as compared with 2% of those in the placebo group, and had decreased to a healthy range (5th percentile to <85th percentile) in 13%

The New England Journal of Medicine is produced by NEJM Group, a division of the Massachusetts Medical Society.
Downloaded from nejm.org by heydar dolati on November 20, 2026.

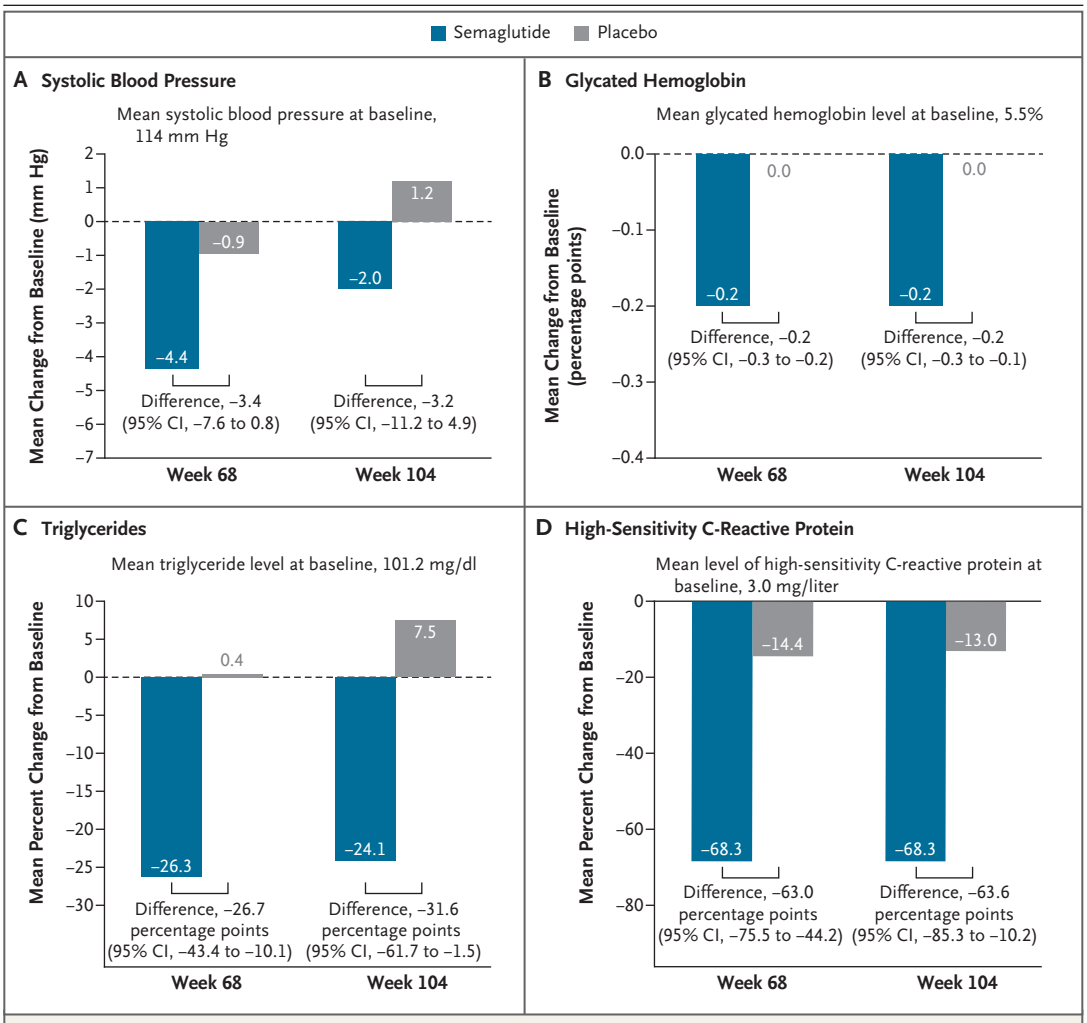


Figure 2. Changes in Selected Cardiometabolic Measures at Weeks 68 and 104.

Data are shown for the full analysis population. Panels A through D show estimated mean changes from baseline in selected cardiometabolic measures at weeks 68 and 104 for the treatment-regimen estimand, with mean values at baseline shown for the overall trial population. Levels of triglycerides and high-sensitivity C-reactive protein were initially analyzed on a log scale as an estimated ratio to the baseline value (within trial groups) and as an estimated ratio to the value in the other trial group. For interpretation, the ratios to the baseline value are expressed as percent changes, and the ratios between the trial groups are expressed as estimated between-group differences, given in percentage points. Percent changes were calculated as follows: (estimated ratio − 1) × 100. To convert the value for triglycerides to millimoles per liter, multiply by 0.01129. Analyses of these secondary supportive end points were not adjusted for multiplicity, and 95% confidence intervals should not be used to infer treatment effects.

of the participants in the semaglutide group, as compared with no participants in the placebo group.

More than half the children in our trial had at least one reported obesity-related complication at baseline. As observed in the STEP TEENS trial during treatment with semaglutide in adolescents with obesity,[14,28] results for measures of cardiometabolic health in this trial, including reductions in waist circumference, systolic blood pressure, fat mass, and levels of glycated hemoglobin, triglycerides, and high-sensitivity C-reactive protein, appeared to be consistent with the primary findings of reductions in BMI.

Potential concerns associated with the use of GLP-1 receptor agonists in children include re-

The New England Journal of Medicine is produced by NEJM Group, a division of the Massachusetts Medical Society.
Downloaded from nejm.org by heydar dolati on November 20, 2026.

Table 3. Adverse Events.*

Event	At Week 68				At Week 111			
	Semaglutide (N=112)		Placebo (N=55)		Semaglutide (N=112)		Placebo (N=55)	
	no. of participants (%)	*no. of events*	*no. of participants (%)*	*no. of events*	*no. of participants (%)*	*no. of events*	*no. of participants (%)*	*no. of events*
Any adverse event	108 (96)	1712	50 (91)	539	108 (96)	2009	51 (93)	621
Serious adverse event†	7 (6)	10	4 (7)	5	10 (9)	15	5 (9)	8
Adverse events leading to discontinuation of the trial regimen	3 (3)	5	0	0	4 (4)	7	1 (2)	1
Gastrointestinal disorder	1 (1)	3	0	0	1 (1)	3	0	0
Fatal adverse event‡	0	0	0	0	0	0	0	0
Adverse events reported in ≥10% of participants in either group§								
Vomiting	74 (66)	322	16 (29)	22	78 (70)	340	16 (29)	26
Diarrhea	66 (59)	159	16 (29)	30	69 (62)	172	19 (35)	35
Nausea	62 (55)	160	12 (22)	30	65 (58)	177	13 (24)	31
Upper abdominal pain	45 (40)	117	19 (35)	33	46 (41)	128	20 (36)	35
Headache	35 (31)	61	15 (27)	37	38 (34)	79	18 (33)	42
Nasopharyngitis	33 (29)	74	20 (36)	40	37 (33)	103	21 (38)	51
Abdominal pain	31 (28)	73	12 (22)	25	33 (29)	80	12 (22)	26
Cough	20 (18)	24	7 (13)	10	23 (21)	29	7 (13)	12
Pyrexia	18 (16)	24	9 (16)	14	20 (18)	27	10 (18)	16
Fatigue	11 (10)	14	9 (16)	11	11 (10)	16	10 (18)	13
Constipation	9 (8)	9	10 (18)	12	11 (10)	13	10 (18)	12
Decreased appetite	19 (17)	21	5 (9)	6	19 (17)	21	5 (9)	6
Eructation	15 (13)	49	1 (2)	1	17 (15)	52	1 (2)	1
Viral gastroenteritis¶	13 (12)	15	1 (2)	1	15 (13)	20	1 (2)	1
Upper respiratory tract infection	9 (8)	13	7 (13)	9	13 (12)	22	7 (13)	10
Influenza	10 (9)	10	6 (11)	7	13 (12)	13	7 (13)	8

The New England Journal of Medicine is produced by NEJM Group, a division of the Massachusetts Medical Society.
Downloaded from nejm.org by heydar dolati on November 20, 2026.

Gastroenteritis¶	8 (7)	14	6 (11)	6	13 (12)	22	6 (11)	6
Injection-site bruising	11 (10)	15	6 (11)	6	12 (11)	17	6 (11)	6
Rash	6 (5)	6	6 (11)	6	8 (7)	8	6 (11)	6
Ligament sprain	4 (4)	4	5 (9)	6	5 (4)	5	6 (11)	8
ADHD	1 (1)	1	5 (9)	5	4 (4)	4	6 (11)	6

* Safety was assessed in the safety analysis population, which included all the participants who underwent randomization and received at least one dose of semaglutide or placebo. Shown are the observed (i.e., as-measured) data for the on-treatment period (the time from the first dose of semaglutide or placebo to 49 days [7 weeks] after the last dose, excluding any temporary interruptions), unless otherwise noted. ADHD denotes attention deficit–hyperactivity disorder.
† Details about serious adverse events are provided in the Supplementary Appendix.
‡ Data shown are the numbers observed in the safety population during the in-trial period (the time from randomization to the last contact with a trial site, regardless of discontinuation of semaglutide or placebo or the use of rescue therapy [obesity medication or bariatric surgery]).
§ Adverse events are listed according to the preferred term in the *Medical Dictionary for Regulatory Activities*, version 29.0.
¶ Gastroenteritis was coded as viral gastroenteritis if a viral cause was specified by the investigator.

ductions in linear growth and in expected gains in lean soft tissue.[29,30] In the present trial, children receiving semaglutide had a greater decrease in the percentage of total body mass composed of fat and a greater increase in the percentage composed of lean soft tissue than children receiving placebo. The larger absolute gains in lean soft tissue with placebo than with semaglutide were consistent with greater overall weight gain with placebo, which included increases in both fat and lean soft tissue. Children with obesity have been reported to have accelerated linear growth before puberty[31]; it is possible that the observed changes in height gain and velocity are explained by the reduction in BMI.

The most common adverse events reported in the trial were gastrointestinal. Vomiting, diarrhea, and nausea were common in the trial population overall but were more common in the semaglutide group than in the placebo group, similar to previous observations with liraglutide in young children.[24] In four pooled phase 3a trials involving adults, the percentage of participants with vomiting was 4 times as high with semaglutide as with placebo (24% vs. 6%)[32]; among adolescents in the STEP TEENS trial, the percentage was 3.6 times as high (36% vs. 10%),[14] and, in the current trial involving children, the percentage of participants with vomiting at week 68 was 2.3 times as high with semaglutide as with placebo (66% vs. 29%). Most gastrointestinal adverse events were mild and transient, with one participant discontinuing semaglutide and no participants discontinuing placebo owing to gastrointestinal events. The frequency of serious adverse events overall was similar in the two trial groups, and no new safety signals were identified.

Strengths of this trial include the 2-year duration of placebo-controlled treatment with obesity medication and the assessment of body composition by DXA in younger children with obesity. Limitations of the trial include the enrollment of predominantly White participants, a lack of screening for eating disorders, and the high percentage of participants in the placebo group (nearly 40%) who discontinued the trial regimen by week 104. The last issue is perhaps not surprising given that limited change or lack of change in the trajectory of the BMI percentile may have resulted in waning interest in both the participants and their caregivers in receiving or administering a once-weekly injection.

The New England Journal of Medicine is produced by NEJM Group, a division of the Massachusetts Medical Society.
Downloaded from nejm.org by heydar dolati on November 20, 2026.

In this phase 3 trial, treatment with once-weekly semaglutide resulted in a significantly greater mean percent reduction in BMI than placebo among children (6 to <12 years of age).

Supported by Novo Nordisk.

Disclosure forms provided by the authors are available with the full text of this article at NEJM.org.

A data sharing statement provided by the authors is available with the full text of this article at NEJM.org.

We thank the participants, their caregivers, and the trial staff who cared for them, and Ben McNeill, Ph.D., and Sophie Walton, M.Sc., of Titan, OPEN Health Communications, for editorial assistance with an earlier version of the manuscript, funded by Novo Nordisk, in accordance with Good Publication Practice guidelines (https://www.ismpp.org/gpp-2022).

AUTHOR INFORMATION

[1] Section of Endocrinology and Metabolism, Department of Internal Medicine, Yale School of Medicine, Yale University, New Haven, CT; [2] Section of Pediatric Endocrinology, Department of Pediatrics, Yale School of Medicine, Yale University, New Haven, CT; [3] Yale Obesity Research Center (Y-Weight), Yale School of Medicine, Yale University, New Haven, CT; [4] Novo Nordisk, Søborg, Denmark; [5] Department of Pediatrics, Yale School of Medicine, Yale University, New Haven, CT; [6] University Hospital for Children and Adolescents, Center for Pediatric Research and Helmholtz Institute for Metabolic, Obesity, and Vascular Research (HI-MAG) of Helmholtz Munich at Leipzig University and Leipzig University Medical Center, Leipzig, Germany; [7] German Center for Child and Adolescent Health (DZKJ), partner site Leipzig–Dresden, Leipzig, Germany; [8] Leipzig Center of Metabolism (LeiCeM), Leipzig University, Leipzig, Germany; [9] Department of Pediatrics and Center for Pediatric Obesity Medicine, University of Minnesota Medical School, Minneapolis; [10] Department of Pediatrics, Paracelsus Private Medical University, Salzburg, Austria; [11] Children's Obesity Clinic, European Center of Obesity Management, Department of Pediatrics, Holbæk University Hospital, Holbæk, Denmark; [12] Novo Nordisk Foundation Center for Basic Metabolic Research, University of Copenhagen, Copenhagen; [13] Novo Nordisk Global Business Services, Bengaluru, India; [14] Division of Pediatric Endocrinology and Diabetes, Department of Pediatrics and Adolescent Medicine, University Medical Center Ulm, Ulm, Germany; [15] DZKJ, partner site Ulm, Ulm, Germany.

REFERENCES

1. Stierman B, Afful J, Carroll MD, et al. National Health and Nutrition Examination Survey 2017–March 2020 prepandemic data files — development of files and prevalence estimates for selected health outcomes. Natl Health Stat Report 2021; 158:106273.
2. Hampl SE, Hassink SG, Skinner AC, et al. Clinical practice guideline for the evaluation and treatment of children and adolescents with obesity. Pediatrics 2023; 151(2):e2022060640.
3. Kumar S, Kelly AS. Review of childhood obesity: from epidemiology, etiology, and comorbidities to clinical assessment and treatment. Mayo Clin Proc 2017;92: 251-65.
4. World Obesity Federation. World obesity atlas 2026: childhood obesity. 2nd ed. March 2026 (https://data.worldobesity.org/publications/?cat=24).
5. TODAY Study Group. A clinical trial to maintain glycemic control in youth with type 2 diabetes. N Engl J Med 2012;366: 2247-56.
6. TODAY Study Group. Long-term complications in youth-onset type 2 diabetes. N Engl J Med 2021;385:416-26.
7. Schwimmer JB, Burwinkle TM, Varni JW. Health-related quality of life of severely obese children and adolescents. JAMA 2003;289:1813-9.
8. Tekchandani N, Mukherjee A, Farook F, Varghese H, Aikoroje P. Understanding how childhood obesity influences educational outcomes: a literature review. Cureus 2026;18(1):e101691.
9. Wiedemann UCH, van den Akker ELT, Barber TM, et al. Early-onset of obesity model: impact of early-onset obesity on comorbidity risk and life expectancy. Obes Facts 2026;19:265-79.
10. Alqahtani AR, Elahmedi M, Abdurabu HY, Alqahtani S. Ten-year outcomes of children and adolescents who underwent sleeve gastrectomy: weight loss, comorbidity resolution, adverse events, and growth velocity. J Am Coll Surg 2021;233:657-64.
11. Alqahtani A, Elahmedi M, Qahtani AR. Laparoscopic sleeve gastrectomy in children younger than 14 years: refuting the concerns. Ann Surg 2016;263:312-9.
12. Pratt JSA, Browne A, Browne NT, et al. ASMBS pediatric metabolic and bariatric surgery guidelines, 2018. Surg Obes Relat Dis 2018;14:882-901.
13. Ball GDC, Merdad R, Birken CS, et al. Managing obesity in children: a clinical practice guideline. CMAJ 2025;197(14): E372-E389.
14. Weghuber D, Barrett T, Barrientos-Pérez M, et al. Once-weekly semaglutide in adolescents with obesity. N Engl J Med 2022;387:2245-57.
15. Kelly AS, Bensignor MO, Hsia DS, et al. Phentermine/topiramate for the treatment of adolescent obesity. NEJM Evid 2022; 1(6). DOI: 10.1056/EVIDoa2200014.
16. Kelly AS, Auerbach P, Barrientos-Perez M, et al. A randomized, controlled trial of liraglutide for adolescents with obesity. N Engl J Med 2020;382:2117-28.
17. Miller JL, Bridges N, Felner EI, et al. Diazoxide choline extended-release tablets in prader-willi syndrome: a randomized, double-blind, withdrawal period study. J Clin Endocrinol Metab 2026;111(6):e1554-e1561.
18. Clément K, van den Akker E, Argente J, et al. Efficacy and safety of setmelanotide, an MC4R agonist, in individuals with severe obesity due to LEPR or POMC deficiency: single-arm, open-label, multicentre, phase 3 trials. Lancet Diabetes Endocrinol 2020;8:960-70.
19. Centers for Disease Control and Prevention. CDC growth charts. September 2, 2024 (https://www.cdc.gov/growthcharts/cdc-growth-charts.htm).
20. World Health Organization. BMI-for-age (5-19 years) (http://www.who.int/growthref/who2007_bmi_for_age/en/).
21. Centers for Disease Control and Prevention. Child and teen BMI categories. June 28, 2024 (https://www.cdc.gov/bmi/child-teen-calculator/bmi-categories.html).
22. Centers for Disease Control and Prevention. CDC extended BMI-for-age growth charts. September 2, 2024 (https://www.cdc.gov/growthcharts/extended-bmi.htm).
23. European Medicines Agency. Saxenda (liraglutide) summary of product characteristics (https://www.ema.europa.eu/en/documents/product-information/saxenda-epar-product-information_en.pdf).
24. Fox CK, Barrientos-Pérez M, Bomberg EM, et al. Liraglutide for children 6 to <12 years of age with obesity–a randomized trial. N Engl J Med 2025;392:555-65.
25. Food and Drug Administration. Wegovy (semagltuide) prescribing information (https://www.accessdata.fda.gov/drugsatfda_docs/label/2026/215256s025lbl.pdf).
26. European Medicines Agency. Wegovy (semaglutide) summary of product characteristics (https://www.ema.europa.eu/en/medicines/human/EPAR/wegovy).
27. Kelly AS, Arslanian S, Hesse D, et al. Reducing BMI below the obesity threshold

The New England Journal of Medicine is produced by NEJM Group, a division of the Massachusetts Medical Society.
Downloaded from nejm.org by heydar dolati on November 20, 2026.

in adolescents treated with once-weekly subcutaneous semaglutide 2.4 mg. Obesity (Silver Spring) 2023;31:2139-49.
28. Arslanian S, Gies I, Goldman B, et al. Effect of semaglutide on insulin sensitivity and cardiometabolic risk factors in adolescents with obesity: the STEP TEENS study. Diabetes Care 2026;49:954-62.
29. Heymsfield SB, Brown J, Ramirez S, Prado CM, Tinsley GM, Gonzalez MC. Are lean body mass and fat-free mass the same or different body components? A critical perspective. Adv Nutr 2024;15:100335.
30. Bennett JP, Prado CM, Gonzalez MC, Heymsfield SB. Clarification and standardization of dual-energy X-ray absorptiometry terminology for accurate scientific communication and clinical diagnostic accuracy. Am J Clin Nutr 2025;122:661-70.
31. Kempf E, Vogel M, Vogel T, et al. Dynamic alterations in linear growth and endocrine parameters in children with obesity and height reference values. EClinicalMedicine 2021;37:100977.
32. Electronic Medicines Compendium. Wegovy 0.5 mg, FlexTouch solution for injection in pre-filled pen (https://www.medicines.org.uk/emc/product/13800/smpc).

Copyright © 2026 Massachusetts Medical Society.

The New England Journal of Medicine is produced by NEJM Group, a division of the Massachusetts Medical Society.
Downloaded from nejm.org by heydar dolati on November 20, 2026.