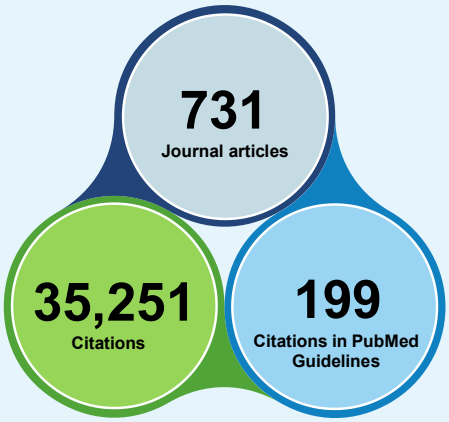
Kaiser Permanente Research Brief

Obesity

This brief summarizes the contributions of Kaiser Permanente Research since 2012 on the topic of obesity, including risk factors, strategies for improving member health and well-being, and translation of research into policy and practice.

Obesity is a common but serious health condition defined by high weight relative to a person's height. Weight-to-height ratios are measured using the BMI (or body mass index) scale. For adults, a BMI of 18.5 to 24.9 is considered a healthy weight. BMIs in the range of 25 to 29.9 are classified as overweight, and BMIs of 30 or greater are classified as obese.[1] Alternate definitions of obesity may be more appropriate for youth, and for different racial groups.[2] According to the Centers for Disease Control and Prevention, approximately 42% of U.S. adults meet the classification for obesity,[3] and the obesity prevalence among children age 2 to 19 is 19.7%.[4]

Kaiser Permanente publications related to obesity since 2012



Source: Kaiser Permanente Publications Library and Scite metrics, as of November 9, 2023.

Obesity is an active area of study for Kaiser Permanente Research. Scientists across the organization have used our rich, comprehensive, longitudinal data to advance knowledge in the areas of understanding risk, improving patient outcomes, and translating research findings into policy and practice. We have published more than 730 articles related to obesity since 2012.[5] Together, these articles have been cited over 35,000 times. These articles are the product of observational studies, randomized controlled trials, meta-analyses, and other studies led by Kaiser Permanente scientists. Our unique environment — a fully integrated care and coverage model in which our research scientists, clinicians, medical groups, and health plan leaders collaborate — lets us contribute generalizable knowledge on obesity, and many other research topics.

Understanding risk

Who is at risk for developing obesity?

Obesity risk is present throughout a person's lifespan, and no one is immune to obesity. Our researchers have identified a host of specific risk factors for overweight and obesity. These include food-related factors (such as eating patterns, the food and food culture at home and in the community, and availability or affordability of healthy and unhealthy eating options),[6-13] characteristics of the residential environment,[14-16] physical activity behaviors and sedentary time (for example, television and screen time),[17; 18] socioeconomic status,[19] exposure to environmental toxins,[20] other health conditions such as asthma[21] and gestational diabetes,[22] and genetic factors.[23-27] For children, growing up in a household among adults with overweight

This brief summarizes a selection of the publications contained within the Kaiser Permanente Publications Library, which indexes journal articles and other publications authored by individuals affiliated with Kaiser Permanente. The work described in this brief originated from across Kaiser Permanente's 8 regions and was supported by a wide range of funding sources including internal research support as well as both governmental and nongovernmental extramural funding.

and obesity is a risk factor,[28] as are experiences of abuse,[29] and one recent study found that children prescribed antipsychotic medications were at greater risk for obesity than children prescribed traditional antidepressants.[30] Kaiser Permanente scientists have also linked the quality of infants' diets with their risks for overweight and obesity in early childhood.[31] Recent data also suggest a significant increase in child and adolescent obesity during the COVID-19 pandemic.[32-34] Obesity is also associated with factors for which the causal pathway is not entirely clear, such as sleep duration and sleep quality.[35-37] Obesity prevalence is higher among certain racial and ethnic populations, a difference that is attributed to a mix of genetic and nongenetic factors.[23; 38-41]

What other health risks do people with obesity face?

People with obesity experience a range of health risks. Among the most pervasive and well-known are cardiovascular and metabolic diseases,[23; 42-46] select cancers,[47-52] lower-extremity injuries,[53-55] breathing and sleep disturbances such as sleep apnea or chronic obstructive pulmonary disease,[23; 47; 56-59] and higher rates of mortality,[60] including mortality associated with COVID-19.[61] In the Patient Outcomes Research to Advance Learning Network's overweight and obesity cohort,[62] and in other studies, our researchers have described specific cardiometabolic risks that are known to be frequently present among people who are overweight or obese. These include elevated blood pressure; elevated levels of low-density lipoprotein cholesterol (or LDL-C), triglycerides, fasting plasma glucose, and hemoglobin A1c.[63; 64] Other research conducted by our scientists has found links between maternal obesity and excessive gestational weight gain, and health risks[65-68] including gestational diabetes and persistent weight concerns for the mother after pregnancy,[22; 69-71] as well as overweight and obesity in the child.[72-78]

Research conducted in Kaiser Permanente has linked obesity with many serious health risks.

- **Cancer**
- **Cardiovascular disease**
- **Dementia**
- **Diabetes**
- **Lower-body injury**
- **Mental health conditions**
- **Premature mortality**
- **Respiratory illness**

Kaiser Permanente researchers are also contributing to emerging knowledge about a host of newly emerging risks, such as the link between obesity and dementia, including Alzheimer's disease.[79-82] Other risks associated with obesity that our researchers have investigated include depression or social isolation,[23] anxiety,[83] experiences of bias and bullying,[23; 84] and reduced quality of life and physical functioning.[85; 86]

Obesity can also affect the treatment of other conditions. Kaiser Permanente researchers have described uncertainty in correct dosing of certain medications, such as chemotherapies,[87] for people with obesity. Women with obesity may also be less likely to complete recommended gynecologic cancer screening[88] and mammography.[89]

Improving Patient Outcomes

What strategies are effective in preventing obesity?

Preventing obesity is a critical strategy to curb the growth in the absolute numbers of people who are overweight or obese globally, which are projected to reach 2.16 billion and 1.12 billion respectively by 2030.[90] A nutritious diet and adequate physical activity are beneficial for people in all weight groups and contribute to obesity prevention.[91; 92] Researchers have also linked inadequate sleep with obesity, suggesting another behavioral factor in preventing obesity.[17; 36; 37; 93; 94]

Our researchers have contributed to the growing evidence supporting methods to encourage behavior change and weight maintenance, irrespective of weight status.[93; 95-97] Kaiser Permanente physicians and researchers have implemented "Exercise as a Vital Sign" within the organization's electronic health record system. This incorporates physical activity questions into routine outpatient visits, and prompts clinicians to offer brief counseling to maintain healthy behaviors and modify unhealthy ones.[98-102] However, there are many barriers to consistently screening for physical activity and delivering the brief intervention,[102] and further work is needed to improve consistent follow-through.

One special population in which weight control is of heightened importance is pregnant women. Our scientists have found that pregnant women, regardless of their prepregnancy weight, often do not receive advice regarding physical activity from their health care providers.[103] Among women who are already overweight or obese, Kaiser Permanente researchers have studied interventions designed for weight loss before becoming pregnant,[104; 105] as well as dietary interventions during pregnancy to limit gestational weight gain.[106; 107]

How does early identification of obesity affect outcomes?

Routine screening is used to identify people who are overweight or obese, and is recommended for children, adolescents, and adults based on the availability of effective treatments.[23; 108; 109] Early identification of unhealthy weight gain may have additional importance because there is evidence that the human body adapts to and defends its excess weight, counteracting calorie restrictions and other dietary changes.[110; 111] Furthermore, after obesity has persisted for some time, biological adaptations are triggered that act on fat storage capacity and dopamine signaling, which helps control the brain's reward and pleasure centers, triggering food overconsumption.[110] As such, the treatment of obesity grows increasingly difficult the longer obesity has persisted.

What are the key factors in effective treatment of obesity?

People with overweight or obesity can modify their behaviors, habits, and environment to improve their health in many ways.[112] For people with obesity and other common co-occurring conditions, even a very modest amount of weight loss can have important health benefits. For example, studies have found that weight loss is associated with declines in stress and depression,[113] with improved blood pressure,[114; 115] and with reduced risks for some forms of cancer.[116]

Behavior change: For people with overweight or obesity, dietary changes are a key factor in weight loss.[117-120] In particular, adopting low-carbohydrate diets,[117] decreasing intake of other energy-dense foods,[118; 119] and reducing consumption of liquid calories (such as from sugar-sweetened beverages)[119] can be effective dietary strategies. These changes can be combined with increased intake of fruits and vegetables, low-fat dairy products, and other foods low in energy density and high in fiber. Increasing physical activity — in combination with nutritional changes — can also contribute to weight loss and weight maintenance.[121-123] Moreover, physical activity is important for people with obesity even if it doesn't result in weight loss. For example, recent research has found that adherence to nutrition and exercise guidance is associated with significantly reduced risks for obesity-related cancers.[124]

Our researchers have studied a range of evidence-based behavioral interventions to address obesity,[125; 126] and have concluded that there is strong support for the efficacy and effectiveness of such programs.[127] Some of the key behavior changes that are associated with maintaining significant weight loss over time include food and physical activity journaling; cooking most meals at home (that is, not eating out); weighing oneself regularly (such as daily or every other day); and setting a baseline for physical activity that is 2 to 3 times more than the standard recommendation of 30 minutes per day 5 days per week.[123; 128-130] Patients have also reported that social support is key for weight maintenance, leading to the recommendation that weight loss programs consider involving family and friends to support long-term success.[130; 131]

Surgical approaches: Weight-loss surgeries are a complement to behavior change approaches for treating obesity.[132] Our researchers have shown that, for people with obesity and diabetes, bariatric surgery is associated with substantial weight loss compared to nonsurgical approaches, and also results in better odds of diabetes remission[133] and reduced risks for microvascular complications of diabetes,[134] cardiovascular or cerebrovascular events,[135] and some types of obesity-related cancer.[136; 137] Kaiser Permanente researchers have described the comparative effectiveness, complication rates, and associated costs of various types of weight-loss surgeries,[138-147] and have described differences in outcomes according to procedure type, age at time of surgery, level of obesity before surgery, and other factors.[148-151] Recent research found no differences in obstetric outcomes between bariatric procedures among women who give birth after undergoing weight-loss surgery,[152] though recent evidence suggests that these women should be monitored carefully to reduce peripartum risks.[153] The benefits of bariatric surgery appear to be durable over time for many, but not all, patients.[154-156] However, there is evidence of differences in outcomes for some racial and ethnic groups after bariatric surgery (such as resolution of metabolic syndrome, overall weight loss, and the safety of the procedure), and evidence that surgery is more effective for younger and less obese patients.[157-160]

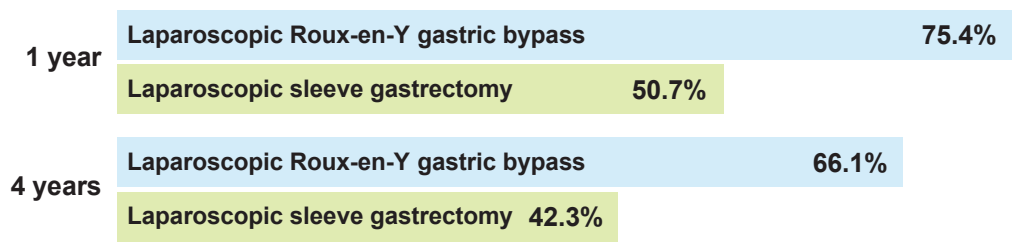
Anti-Obesity Medications: Modern approaches to obesity management have increasingly incorporated pharmacotherapies, such as phentermine and semaglutide.[161; 162] The effectiveness of these medications is well-established,[163] and research conducted by our scientists has found evidence of sustained weight loss and safety up to 2 years after treatment initiation.[164] Nevertheless, these medications are often not prescribed to eligible patients,[165] often due to concerns about costs and safety.[166]

Children: Screening and early intervention are particularly important in children, since obesity during childhood and adolescence is predictive of obesity as an adult.[167] Treatment of obesity in children differs from treatment of adults, because children are often reliant on others (parents, other family members, or school staff) for their nutrition, access to or engagement in physical activity, and other factors.

Our researchers have conducted a number of studies testing models to improve physical activity and nutrition in schools,[168-171] and have created other parent-focused approaches.[172-175] In recent years,

Older adults who had gastric bypass experienced greater weight loss at 1 and 4 years than those who had sleeve gastrectomy. However, the complication rate for gastric bypass was higher (30.5% vs. 15.4%).[148]

% Excess weight loss



evidence to support the effectiveness of behavioral interventions for weight management among children and adolescents has emerged, and routine screening for obesity in youth is now recommended.[23; 108]

Translating Research Findings Into Policy and Practice

Kaiser Permanente is a learning health care organization that works to systematically use research to inform and improve practice both within and outside Kaiser Permanente. Research, clinical, and operational partners within Kaiser Permanente have tested a range of interventions to reduce the risk of obesity and improve outcomes for people with obesity. We have reviewed the evidence for intensive behavioral weight-loss counseling programs delivered in person and by telephone, and by a range of interventionists, such as primary care providers, dietitians, and medical assistants.[123; 162; 176-178] We have implemented "Exercise as a Vital Sign"[98-102] in our electronic health record system, and continue to encourage clinicians to engage with patients of all weights to promote healthy habits. Kaiser Permanente has also invested in community health initiatives that promote obesity-prevention policies and environmental changes in the communities we serve.[179-182] More recently, we have studied programs aimed at improving physical activity and nutrition among patients following bariatric surgery,[183; 184] as well as lifestyle-based telehealth interventions to reduce excess gestational weight gain during pregnancy.[185; 186] Our researchers have participated in studies assessing obesity prevention programs based in the workplace and at schools, as well as community-level environmental and policy changes such as healthier offerings in vending machines and cafeterias.[168; 169; 179; 187; 188] These studies have suggested that site-based interventions must be high intensity to be effective at a population level.[180]

Kaiser Permanente's research on obesity since 2012 has been cited nearly 200 times in consensus statements and clinical practice guidelines. Guidelines citing our research have been published by a wide range of entities, including the American Society for Metabolic and Bariatric Surgery, the American Association of Clinical Endocrinology, and the American Heart Association. In addition, our researchers and clinician scientists have directly contributed as authors of guidelines for the management of overweight and obesity,[109; 163; 189-191] management of weight gain during pregnancy,[192] routine assessment of physical activity in health care,[102] screening for obesity in children and adolescents,[23; 108] and obesity prevention in midlife.[193; 194] Kaiser Permanente has also participated in the Obesity Medicine Education Collaborative, an effort to improve medical education related to obesity management through the development of new standards and benchmarks.[195] Our scientists are also leaders of the National Institutes of Health's Environmental Influences on Child Health Outcomes program, a long-term national initiative investigating relationships between factors in a child's early life and the subsequent development of obesity.[196] Finally, researchers at Kaiser Permanente in Colorado are participants in the Childhood Obesity Data Initiative, an effort to further research in pediatric obesity by integrating electronic health record data from multiple community-based health care organizations.[197; 198]

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