Transcript Details
This is a transcript of an educational program. Details about the program and additional media formats for the program are accessible by visiting: https://reachmd.com/programs/frontlines-osteoporosis/preventing-bone-loss-in-older-adults-do-weighted-vests-or-resistance-training-work/32339/

ReachMD
www.reachmd.com
info@reachmd.com
(866) 423-7849

Preventing Bone Loss in Older Adults: Do Weighted Vests or Resistance Training Work?

Announcer:
You're listening to *On the Frontlines of Osteoporosis* on ReachMD. And now, here's your host, Ashley Baker.

Ashley Baker:
This is *On the Frontlines of Osteoporosis* on ReachMD, and I'm Ashley Baker. Joining me to discuss her research that was recently published in the *JAMA Network Open* that examined whether weighted vests or resistance training could help offset weight loss-associated bone loss in older adults is Dr. Kristen Beavers. She's a Professor of Internal Medicine in the Section on Gerontology and Geriatric Medicine and an Associate Director of the Sticht Center for Healthy Aging and Alzheimer's Prevention at Wake Forest University School of Medicine. Dr. Beavers, thanks so much for being here today.

Dr. Beavers:
Happy to.

Ashley Baker:
So if we start with some background, Dr. Beavers, can you walk us through the clinical problem that motivated your research on the bone health risks of weight loss in older adults?

Dr. Beavers:
Sure. I am interested broadly in weight loss in older adults and whether it's a good or bad thing—and I maintain that it's good—and how to make a good thing better. We know that obesity is a problem for older adults, or for adults period. Older adults are no exception to this rule. About two-thirds live with obesity, which contributes to many chronic disease risks as well as mobility, disability, things of that nature. And we know that when people want to lose weight, they want to lose fat. But some of what you lose is not fat; it's muscle and bone. And for older adults, in particular, that can exacerbate risk of fracture or disability. And so thinking about ways to minimize muscle and bone loss with weight loss is something our group has been doing for the past 10 years and underscored the premise of the *INVEST in Bone Health* study.

Ashley Baker:
Now, as I understand it, your team carried out a 12-month randomized trial with three arms: weight loss alone, weight loss plus weighted vest, and weight loss plus supervised resistance training. So what went into your decision to test these particular interventions side by side, and what makes this trial unique compared with earlier work?

Dr. Beavers:
I think the more novel aspect of this study was certainly the weighted vest. We selected a weighted vest for two reasons. The first was that we were trying to counter the weight loss-associated bone loss. So one of the reasons that you lose bone when you lose weight is you're unloading yourself. This is just a physiologic response. Your bones respond to the stresses that they're placed under. That's how they adapt. And so when you lose weight, you are unloading your bones, and you're losing some. And you might think that that's adaptive, but honestly, the fact that we know that older adults who lose weight will fracture makes it something that we think is worth trying to prevent if we can.

© 2025 ReachMD

So the weighted vest is neat in that it allowed us to target the weight loss-associated bone loss in a pretty sophisticated way. So for every eighth of a pound of weight that our participants lost over the course of this year-long study, we were able to match that with the weight in the vest, effectively kind of fooling your body into thinking that you are staying weight stable when, in fact, you were losing weight.

The other thing about the vest that I think was neat is that it overcomes many of the traditional barriers to resistance training. I do have a cross appointment in the Health And Exercise Science department—and so I say this wishing that this weren't the case—but a lot of older adults just don't want to or aren't able to do the volume and intensity of resistance training that's needed to stimulate the musculoskeletal system. In addition, we know that traditional resistance training often requires access to a gym. There's usually some cost associated with it—not always, but sometimes. You might like, especially for older participants, to have safety supervision. These things may or may not be possible, and a weighted vest overcomes a lot of those barriers. We thought in that sense that it was worth a try to see if this might be a more translatable exercise strategy that older adults—not everyone, but some of them—might be more willing to do.

Ashley Baker:
Well, with that background in mind, let's turn to the results. At the 12-month mark, what did you find regarding the impact of weighted vest use or resistance training on hip bone loss?

Dr. Beavers:
Yeah. So our primary endpoint was total hip bone mineral density. We chose this outcome because it is predictive of hip fracture; those are debilitating endpoints for older adults, and we'd really like to avoid those if we can. We didn't see an effect of the interventions on being able to mitigate weight loss-associated bone loss. So across the board, everyone in our study was assigned to a hypocaloric diet, so they reduced their calories, and they had a behavioral intervention helping them to achieve weight loss, and they did. They lost weight—on average about 10 percent across the board. We had hoped that in comparison to our weight-loss-only group that our groups that wore the vest or did resistance training would see less bone loss, but we didn't see that across the board. Everyone lost about 1.5 to 2 percent of their hip bone mineral density. So that was not what we hypothesized, but that's what we found.

Ashley Baker:
For those just tuning in, this is *On the Frontlines of Osteoporosis* on ReachMD. I'm Ashley Baker, and I'm speaking with Dr. Kristen Beavers about the *INVEST in Bone Health* trial, which explored strategies to reduce bone loss in older adults pursuing weight loss.

Now, beyond hip bone density, Dr. Beavers, your team also measured body composition, strength, and bone turnover markers. Which of those secondary outcomes stood out to you, and how might they inform the way we think about weight loss in older adults?

Dr. Beavers:
Yeah. I'll start with the bone turnover markers because they're probably the most closely related to the bone density measurements that we were just talking about. So the biomarkers of bone turnover that we measured in INVEST are CTX and P1NP. These are blood-based markers that give us an indication of whether we are laying down new bone, which would be signified by an increase in P1NP, or increased bone breakdown, which would be signified by an increase in CTX. And we didn't see any difference in our bone breakdown markers by group or time; we didn't see a difference there. However, we did see an increase in P1NP in our exercisers—our vest and resistance training group—compared to weight loss alone. So weight loss alone saw a reduction over 12 months in P1NP by about 10 percent-ish, and the other group saw an increase by about that same order of magnitude. So this wasn't the primary endpoint, but it does suggest that there may have been more bone being laid down in response to weighted vest use or resistance training as compared to our weight-loss-alone group, which does align with what we hypothesized.

Regarding the other measures that you asked about, we looked at body composition. We actually measured this in several different ways, but the way we were reporting on it first in the primary outcome paper was to look at total body fat mass and lean mass by dual-energy X-ray absorptiometry, or DEXA. This is clinically how body composition is most often assessed. There are other ways to do it though. We saw that everyone lost lean mass just like they lost bone mass, but I will say that the lean mass loss was less than I would have expected. So we only saw about an 8 percent reduction of total weight loss as lean mass in all groups across the board. With lifestyle-based weight loss, you might think this would be closer to 20 percent, so a doubling in what we saw.

© 2025 ReachMD

Another thing that I think is interesting—although we've seen before—is that our resistance training group saw augmented fat mass loss compared to weight loss alone in the weight-loss-plus-vest group. And so typically, I think when people think of resistance training as something to add to weight loss, you think about muscle sparing; you don't necessarily think about increased fat mass loss. But we saw that the group that was randomized to weight loss plus resistance training lost about 24 percent of fat mass, whereas our weight-loss-only group lost about 18 percent, so there was a significant differential there too.

Ashley Baker:
And if we zero in on another aspect of your findings, weighted-vest participants wore the vest an average of seven hours a day, while resistance-training participants attended about 70 percent of sessions. With that being said, how should we interpret these adherence and safety data when thinking about their real-world use?

Dr. Beavers:
Yeah that's a great question. Let me start with the resistance training first just because I think that one is a little more translatable to real-world use. So we asked our participants to do an hour-long, structured, center-based resistance training about three days a week, and as you mentioned, they attended about 70 percent of those sessions—a little north of that—averaging a little over two days a week, which we were actually really happy about because that aligns with our physical activity guidelines of two days of strength training a week. INVEST was designed with that in mind to try to select an exercise prescription that would be representative of what our national guidelines tell us to do.

Now, the weighted vest in terms of how we used it, I mean, there aren't really guidelines, and I would say that the way that we used weighted vest in INVEST is not how I think people right now are looking at weighted vests, like to just wear them during a walk up and down their neighborhood for 30 minutes. So again, we were very interested in thinking through whether the weighted vest could be used during activities of daily living to counter the effect of weight loss on bone loss and to try to keep folks weight stable.

Ashley Baker:
Lastly, Dr. Beavers, your findings suggest that neither intervention fully prevented hip bone loss, so where do you think the field should go next?

Dr. Beavers:
Yeah, that's a great question. And I will say this is why you do the science and research, right? We were certainly, I'd say, surprised. We hypothesized that these interventions would work; they didn't. At least the resistance training finding does contribute to a mixed body of literature on the ability of exercise to mitigate weight loss-associated bone loss. I certainly think that exercise is beneficial. I think that it can affect fracture-related risk factors. I think it has a more pronounced effect on muscle function than bone. There certainly are studies that suggest that exercise can affect bone but, again, not all of them. The effect is probably less than you would think across the board if you look at all these studies, so to me, what that says is that we need to be thinking about alternate or adjuvant strategies.

So one thing that our group has recently been exploring is the possibility of combining exercise with osteoporosis medications. These are medications that have been on the market for a long time to manage and treat age-related bone loss, and we are curious if we can repurpose these medications to combat weight loss-associated bone loss, both in our older participants and in bariatric surgery patients who lose a lot of weight and bone. So that's one avenue.

I think it's also interesting to me why exercise isn't more effective and if there are strategies that we could target to better understand that. So one thing that our group and others are interested in are trying to incorporate more technology into our intervention monitoring to help participants stay more adherent. What we found with the *INVEST in Bone Health* study, for instance, is that people might be wearing the vest for seven hours a day, but if you're not standing while you're wearing it, let's say, then you're not really exploiting the gravity or the loading effect. And so we need to think through if there are ways that we could better encourage folks to be moving around while wearing a vest or even just during activities of daily living to try to get in more exercise bouts throughout the day; that's another area that our group is interested in pursuing.

Ashley Baker:
Well, with those forward-looking comments in mind, I want to thank my guest, Dr. Kristen Beavers, for sharing her research findings with us today. Dr. Beavers, it was great having you on the program.

© 2025 ReachMD

Dr. Beavers:
Thanks. Happy to be here.

Announcer:
You've been listening to *On the Frontlines of Osteoporosis* on ReachMD. To access this and other episodes in our series, visit *On the Frontlines of Osteoporosis* on ReachMD.com, where you can Be Part of the Knowledge. Thanks for listening!

© 2025 ReachMD