DANNY LENNON: If we jump straight into things, today, we're mainly going to focus in on weight loss maintenance. And maybe before getting into weight loss maintenance, specifically, that needs to be preceded with a bit of a discussion around weight regain, and I think there's some interesting aspects to cover off this. So at least to me from the outset, it seems that with any of those longer term weight loss programs or interventions, we tend to see a pretty consistent graph of what body weight changes look like, and we see like this almost peak in weight loss within about a six month period, followed by this gradual regain over the months and years ahead. And there's various different statistics that we can maybe bring up that vary depending on what paper we're going to look at, and when we look at that weight regain prevalence, and there's two sides to that, how much weight is regained and then in how many people, and that may be an interesting caveat. And I think the other aspect, I think would be interesting for us to jump into would be around how this shapes some of the narrative of dieting doesn't work, and there can be quite a vociferous debate on that topic where there's maybe merit in different points.

ALAN FLANAGAN: Yeah, I think there are two things that are really helpful to try and define, or at least be more definitive with what the actual parameters are, when we talk about, say, the statistic of diets don't work or the statistics in relation to weight regain, we typically talk about long term success. But that's quite arbitrary, and so the question is: what's the definition of success? And what's the definition of long term? And what I find interesting is when we start to pick up those two concepts, and try and put more kind of scientific explanations to both of them, a bit of a different picture emerges. And when we typically talk about success, mostly in the research, it'll be defined to say a 5 to 10% loss relative to initial body weight. When we talk about long term, that's generally defined in the research as one year. So we're typically into already two issues, because one is one year is not representative of really the time course of weight regain, and one year is very easy to also mislead in both directions. It's very easy to mislead and say that there's no success in weight loss interventions or that dietary interventions fail, for example. It's also very easy with other studies to make a case that all dietary interventions work and are successful in "long term success". And neither of those positions are actually helpful, particularly when we have to think about – so if we look at six months' trials, for example, you can often get a mean weight loss of between, say, five to eight kilos, give or take. But you also have a mean regain of between three to six kilos. Now, if you wanted to turn that into a percentage, relative to it, you could make a case that between 65 and 100% of diets fail. But that's a reflection of the operational definitions that have been given to both the concept of success and also long term, the concept of long term. And so, I think it's important to, when we look at some of the actual evidence for success, typically, what you see is that duration of maintenance is an important factor, and that's going beyond one to two years, and between two and four years appears quite crucial in that sense. So I think

probably it's more appropriate to define successful maintenance, and certainly in the context of regain, as probably that longer term period, say, between two and five years. And then I think success has to also be defined as relative to the, I think, what people focus too much on is, was there any weight regained at all. And again, that's relative to absolute weight loss. So someone losing five kilos and regaining three is distinctly different to someone losing 15 kilos and regaining five, in terms of the magnitude of reduction that's maintained, and how that then correlates to risk reduction for cardiometabolic disease. So for me, it's those two operational definitions of what's long term and what success, and how does that then relate to factors like absolute amount of weight loss, duration of weight loss maintenance, and then we can start looking at the behavioral factors that correlate with those successful maintainers.

DANNY LENNON: Right. Yeah, I think that's actually really useful, because trying to answer a question of do diets work or not, and looking at the statistics of, oh, X percent of diets fail, as you say, that doesn't really make much sense unless we look at some of those different parameters. So I think there's at least three, based on what you just said, we need to take into account the duration of what that period of weight loss maintenance is going to be; second, the amount of weight regain, and probably as a percentage of that weight that was lost; and then when we're looking at a group of people, the prevalence rate of that weight regain, but again, understanding are we talking about any weight regain, complete regain, or a certain threshold off that, because there can clearly be benefit to a situation where someone has lost weight, regained some of that weight, but is in still a net negative lower body weight, depending on what that amount is. Right? And so I think having those parameters at the front of our mind can probably start a more accurate reflection of digging through these statistics.

ALAN FLANAGAN: Yes, absolutely. What we're ultimately going to be interested in as well, is obviously the absolute numbers. I think it's fairly pointless to make a case that, oh, well, 2% of people managed to maintain X amount of weight over five years, because we're still coming back to this idea of that's not a representative of the majority. But if there is evidence in the literature, which there is and we'll get into that, one or two studies in particular, where over a long term, and in the LookAhead trial, for example, we're talking about eight years of follow up, what are the numbers in that case. And that that becomes a bit more encouraging when you start to then dig into some of the correlates of that success whether that's number of practitioner context and all this kind of extra stuff. But yeah, I think it’s a diffusion point of definition at the stars, because it is an emotive topic and we tend to have quite a dichotomy pitchforked battle, like a lot of things in nutrition, between weight loss is never appropriate or ever warranted or ever successful on one side versus weight loss is appropriate in all circumstances, everyone benefits from it, and it should be recommended ubiquitously. And neither of those positions are necessarily helpful or even accurate characterizations of the research that's there.

DANNY LENNON: Oftentimes, I think it's one of those cases where a certain idea gets distilled down into a soundbite that then gets perpetuated by a community of people that gets further and further away from the original point that was made. And in this case, that probably happens on both ends of the diets don't work meme, is really, if you wanted a strawman that, you could say, that's clearly not the case, and a lot of people, particularly in the fitness industry will do that, and say this position is obviously untenable; of course, diets can work; I've clear examples of where they work in a long term setting as well. But if you were to instead steel bend that position, you could see clearly where the idea is coming from, in the fact that there are some real challenges for people, number

one, losing sufficient amount of weight in the first place; two, being able to maintain that long term; and then three, some of the other downsides that that presents for an individual that you can improve their health without doing so. And I think that's a much stronger position that is actually one that needs to be really carefully considered by maybe more practitioners than currently do so.

ALAN FLANAGAN: Yeah, absolutely. I think it comes as a way of maybe distilling it as is, considering I don't think a lot of people in nutrition, generally consider weight loss as an intervention, inherently carrying any risk. So I think a lot of people view it as just benign, as an intervention or recommendation, and it's not benign. There are complex myriad of psychosocial and behavioral factors that all coalesce to influence whether it is appropriate in a given individual, and whether in a given individual it will be successful. And we can tease into some of those behavioral correlates in the course of the podcast, but I think that graph that you're talking about of this kind of decrease, this 5 to 7, 5 to 10%, within an initial maybe six months to kind of one-year period, and then this almost kind of linear regain, what I find interesting is, when you dig into that time course of regain, you tend to see it almost beginning within the first year. So if we're looking at the difference between people who successfully maintain versus regain, regain is almost evident practically immediately upon cessation of the intervention, or within the first year. And if it has started to occur within the first year, it tends to just progress linearly over time, and I think that's also instructive, because it suggests that there is this time period of perhaps 12 to 24 to 48 months in which, if there is a degree of success – and that's not saying that there is literally zero weight regained, but if, as a percentage of weight loss, that is maintained in that period, then the chances of success start to increase almost exponentially. And I think going back to some of Rena Wing's research in the 90s, if I remember correctly, once you

started – and they were looking at regain, once you went over the one-year mark or the two-year mark, the likelihood, once you were beyond two years, there was a 50% lower chance of regain, and people who maintained to five years had a 71% lower chance of any regain. So there is this time course in this two to five-year periods that seems to kind of quite capture their protection against regain, and that strengthens linearly over time, just as people who start to regain within a year also regain linearly over time. So it's kind of like this competing, almost a similar kind of trajectory in terms of the time course of when one starts to be successful versus when the other starts to be unsuccessful.

DANNY LENNON: It's interesting, it's almost like a lag time effect that you mentioned there of before you start to see what we categorize as actual weight regain where, as things start changing to give that graph, and I think one of Kevin Hall's papers, kind of put some mathematical models to try and show why this is commonly the case, and they kind of used the phrase exponential decay of adherence. Yeah, and you see why you see this change in caloric intake gives that curve, it starts changing, and then suddenly, as that curve becomes exponential, that's when you see the right gains start to head off.

ALAN FLANAGAN: Yeah, and one of the interesting things that I found in some of the kind of mid 90s behavioral research, and honestly, I really think this is somewhat of a failing of the research community that this hasn't become a just default, kind of almost inclusion or exclusion criteria in trials, in intervention trials, where the intervention is to lose weight. One of the, if you look at either the lean habits, the Westenhofer research, or also Rena Wing's research, one thing that was interesting was that in the few studies that quantified baseline behavioral characteristics in relation to factors like disinhibited eating, restrained eating, depression scores, and binge eating, number of previous attempts at intentional weight loss,

when you stratified that baseline, when you quantify that as baseline characteristics, they were the characteristics that were predictive of immediate regain once the intervention was over. And this is actually really important, because what this is suggesting is that people within interventions, who start to regain immediately, might have been people who were struggling before an intervention even began. The implication, of course, is that they never should have been pushed in intervention in the first place. But in the absence of screening for those issues, we tend to just assume – again, this comes back to this assumption that it's a benign intervention, so people are placed on a diet where we have research going back 20 years that indicates that people who regained almost instantly are people who were behaviorally struggling with diet, either displaying high levels of restrained eating or disinhibited eating or depression. Prior to an intervention, why would you put someone on an energy restrictive diet? And let's face it, when you look at some of the actual diets that are the interventions in many weight loss studies, like, who would want to eat? So I think that's a really important caveat, and I think that the idea that we haven't ubiquitously screened people for these factors prior – and some interventions do, but the majority that I've ever read, don't, and I think that's a real failing within the research community not to consider that this might be something that you then want to exclude people, because that would put them at risk. And if we didn't have people with these behavioral characteristics and interventions, might that have changed all of these means that we tend to talk about in terms of absolute weight lost, regain, and all of these other factors. I don't know, and that's purely speculative, but I'd offer that in the absence of screening, we simply don't know, and not knowing the answer to that question, I think is a fairly poor reflection of how seriously we take those issues, and also a reflection of considering the intervention to carry no inherent risk.

DANNY LENNON: Yeah, and I think even from an anecdotal perspective, there's many competent practitioners that would pride themselves on trying to identify if someone has a poor relationship with food or other behavioral or psychological demands that may make going on a diet problematic for them, and making sure those are addressed before there is any intervention if there ever is an intervention. And I think, like you said, that there's a clear basis for that, and I'm sure we'll get to some of those psychological factors later, but particularly with the internal disinhibition that you mentioned around people eating maybe in response to their emotions, feelings, and so on, there's at least some of the study, I think one of the papers I looked at was by Lillis, where they showed that during the dieting period, so that weight loss intervention, the people who decreased their internal disinhibition the most during that time, that was predictive of them having the best results off the back end when it came to weight maintenance, which is kind of unsurprising, given some of the stuff you just said, and obviously correlated to some of that flexible dietary restraint, which you also mentioned. So I think that's something we can definitely open a tab on and get into, but I think, yeah, they're very important to consider in this conversation.

ALAN FLANAGAN: Yeah, I think the fact that what appears to be completely consistent that whether no matter how far back we go with kind of weight loss research and trying to look at the characteristics of successful maintenance or regain, it's all behavioral, it's all behavioral correlates of these two different outcomes. And so really, the discussion becomes quite deep into these psychological predictors of success, and also we know that the kind of psychosocial factors are really important when it comes to non-homeostatic control of eating behavior or influences on eating behavior, the word control can be a bit... And then we even get into interesting delineations between flexible and

rigid dietary restraints were generally considered separate psychological constructs. It would appear that they're more of a spectrum of the same construct, as opposed to, often again, in the fitness community, they're kind of portrayed as two separate things – you’re flexible or you're rigid, but actually it's a spectrum of behaviors. And that's an important factor because in, I think it was still the lean habits study, they looked at eight behavioral characteristics at baseline flexible versus rigid dietary control, and other factors like meal regularity, eating situation as a behavior, are you sitting down, are you undistracted, and food choice. And I think at the three-year follow up, it was participants who had made the most behavioral improvements out of the eight behavioral correlates they looked at, those that made between five to eight behavior changes were the ones that were successful; and the two behaviors not associated with any increased probability of successful maintenance over the three years were rigid control of food intake and restriction of food quantity. And so that sounds like a paradox, because, well, a degree of energy deficit is required, how could these factors play into a failure to – I don't want to use the word failure here, I want to be careful with my language, but weight regain over time, and it appears, again, that it’s a predictive behavioral correlate even pre intervention.

DANNY LENNON: It's interesting you bring up that spectrum of restraint, because I think this actually can be explanatory in that disconnect between, let's say, that the outer edges of the fitness industry and the non-dieting community, and I'm not making a – I don't mean to make a generalization there, I mean, for the people who may be attached to too black and white of a perspective in either of those cases, some of that disconnect can be related to the idea that a thought, any dietary restraint is bad. But on the podcast before when Jake Linardon who is on and he's done a lot of good work down in Melbourne, he talked about, well, what really

hasn't been looked at all that much within research is when it is really teasing apart, when it comes to dietary restraint, instead of looking at restraint versus no restraint, thinking that restraint occurs across the spectrum that you just mentioned, from rigid at one end to completely flexible, and that there may be differences depending on what level of restraint you include. And at least there's plenty of research that would indicate that for many different measures, but applying that to a context, like health outcomes for people that are going to be controlling their eating in some manner, and I think that can be explain some of the disconnect that can sometimes happen between those two groups.

ALAN FLANAGAN: Yeah, I think that's a really important point, because what appears along that construct is that at the more restrictive end of this spectrum what is actually the problematic kind of cognitive dysfunctionality, so to speak, is dichotomous thinking about food, it tends to correlate to dichotomous thinking about a number of behaviors, but particularly dichotomous thinking about food. And when you go more to the flexible restraint aspect, you don't see that. So what it indicates is that it's the dichotomous thinking towards more the kind of rigid control end of the spectrum, rather than just restraint per se. That's the underlying factor that might predict weight regain, and I think that's kind of a really important distinction. So flexible dietary restraints – the whole concept of dietary restraint might be a distinct concept, it maybe this kind of continuum, but there are behaviorally distinct kind of outputs from one end versus the other with restraint per se not necessarily being bad, flexible restraint being associated with better outcomes than the dichotomous end of the rigid spectrum.

DANNY LENNON: And before we dig into maybe more of those psychological factors to kind of round out some of the weight regain issue, you had mentioned that there's almost this threshold that we need

to go beyond in terms of long term interventions, or at least there's something to be gleaned from having several years of follow-up, and I know you brought the LookAhead trial and maybe there are a few other, are there specific interventions you think might shed some good light on this?

ALAN FLANAGAN: Yeah, I think LookAhead is probably putting the best foot forward in a general sense, and so, for people unfamiliar with LookAhead, it was a diabetes prevention, whole lifestyle intervention program. If you look at the mean weight loss, and what they looked at was an intensive intervention group, and kind of a normal traditional treatment, but in the intensive intervention group, if you look at the mean, after one year, they lost about 8.5% of body weight, and at year four, that was 4.7. So it wasn't entire, and there was still a 50% reduction from baseline. But by year eight, they still had 4 to 4.7. So what this suggested was between year four and year eight, there was a stabilizing effect, and I'm still only talking about the mean here. When you scrutinize the means closer, what emerged was that those that lost over 10% of initial body weight in the first year of the intervention, were significantly more likely to maintain between five to 10% weight loss at four years. Of that, 42% had maintained 10% of weight loss, which is relative to the wider literature, a fairly staggering number; and 70% have maintained over 5% of weight loss; and at year eight of the intervention, those numbers were 39%, had maintained over 10% of weight loss, and 65% had maintained 5% of weight loss. So between year four and eight, even in the groups with the highest amount of weight loss, there was a relatively stabilizing effects of the maintenance and little to no additional regain, and that's putting large numbers of people from that intervention in a range of loss in terms of the five to 10% mark, where there was a significant benefit in terms of risk reduction, and we would see that both for cardiovascular disease as well as diabetes.

Now, what I find most interesting in that is when you scrutinize the behavioral factors in the intensive support group in the LookAhead trial, they had small groups of 10 to 20 people in the intervention group that met three times a month for the first six months, and two times a month, up to one year, and then one time every month, so once a month, right up until the eight-year mark. But in addition to that monthly in-person session, they had an additional session with a different interventionist, which could have been a dietician or a psychologist or an exercise specialist every month, and a potential second contact that was optional by phone or email, which was every two weeks, and they were also in terms of the interventionists the various multimodal healthcare professionals involved, also counselled to factor in cultural differences, employee different motivational interviewing, strategies, self-regulation theory, relapse prevention, and problem solving. And so, yes, this is a really intensive intervention, but for me, the one thing that's always jumped off the page about the kind of, shall we say, responders in the LookAhead trial that maintains significant weight loss between five to 10, between years four and eight, up to your four and between years four and eight, was they were the ones who engaged with the most of these various in-person contacts that were available throughout the study period.

DANNY LENNON: Maybe as a spoiler for what we would discuss later on, but just to already underscore something you've already said and that this trial even highlights further is that those behavioral and social support and psychological factors are going to be the main thing driving these success rates as opposed to worrying too much about specific dietary composition to any large degree. And there are some small things we can mention, but I think so much of the focus becomes on what is the best diet for weight maintenance, and again, it's kind of like, what is the best diet for X. It's

like, well, that's probably not the right question first. But here is even more clearly that there's this over emphasis on diet, when it comes to weight loss into thinking that change of body composition, long term weight maintenance comes down to many things beyond diet that are probably even more important or predictive, at least.

ALAN FLANAGAN: Yeah. I find, I find LookAhead interesting to contrast with. There was an Australian intervention, Purcell was the lead author, which wanted to look at rapid weight loss versus gradual weight loss and how that affected weight regain. And there is about, in total, three years of follow up. And if you look at the practitioner contacts in that intervention, the participants met with the study dietitian, biweekly. Now because the gradual weight loss was longer than the rapid weight loss group, they actually had more dietitian contacts; they had 18 versus six, because the rapid weight loss intervention was over 12 weeks, and the gradual one was over 36 weeks. But during the maintenance phase up to three years of follow-ups, they met with a dietitian at four weeks after the intervention, 12 weeks, and then every three months thereafter until the end of the study. So if you contrast that with LookAhead, LookAhead was multimodality, really high level of frequency of practitioner contacts, whereas this intervention was not multimodal, had no behavioral targets, really sparse practitioner contacts. And what was interesting was the prescription for if weight started to be regained, was to restrict energy again, and try and lose the weight that was being regained, which seems, if we factor in the totality of literature to be an exercise in total futility, it seems to be really consistent that if people begin to regain weight, possibly the least effective thing to do is tell them to start to restrict energy again, with a view to purposely re-losing whatever weight is being regained. That just seems to be an exercise in futility.

DANNY LENNON: And I don't know how much we want to get into the National Weight Control Registry, but I think it's useful to bring up just because there was actually a really good observational study that Diana Thomas, I think, and her colleagues did. So just for some context for people, the National Weight Control Registry is this big investigation of like 10,000 plus people, I think, at this point. They have to have lost at least 30 pounds, about 13 kilos, and maintained that loss for five years or more. I think the average in that weight loss is actually about 33 kilos or 70ish pounds. Now, what Diana Thomas's paper was like a 10-year follow up of 2500 of those people, and they had something like 87% of them were maintaining at least 10% of that weight loss after both the five-year and the 10-year mark. But they also found that that larger initial weight loss was associated with a higher probability of long term weight loss maintenance; and that's something that you do see in other shorter term trials as well, that faster initial weight loss, particularly in groups of people with obesity tends to correlate with it. They don't essentially regain all that weight back because it was more difficult of a dieting period or they had to go more rapid, I think a common myth is that you'll definitely gain it back because you've been restricting so much, doesn't seem to play out at least in that; but I think there is some, depending on the study, there probably is some variance in that response too.

ALAN FLANAGAN: Yeah, I think, well, that Australian trial that I mentioned that was in whether participants were in the gradual or rapid group, they just all started regaining weight, and they all regained the majority of it. But it's not necessarily always seen – there was an Arne Astrup study way back in the 90s, which looked at a rapid weight loss intervention using a very low calorie diet, and then after the intervention – so everyone lost race kind of really quickly in this intervention, and then after the intervention, they were then randomized to either a kind of ongoing low fat, high

carbohydrate, high fiber diet, or just a fixed energy restricted diet. And they did have intensive patient follow up, and follow up support, and at two years' follow up, the fixed energy – so they lost 13.6 kilos, give or take, in all participants. Then they're randomized to either this kind of high fiber, high carbohydrate, low fat diet, or just an energy restricted diet. And by two years' follow-up, the energy restricted diet had regained 11 kilos and the ad libitum, low fat, high carb, high fiber diet had regained only 5.4. So this, again speaks to the importance of being really clear about what we're talking about in absolute terms, what's the magnitude of weight loss relative to regain. And while it indicated that the kind of initial rate of weight loss didn't really have an influence on maintenance at two years, what actually influenced maintenance for two years was the dietary modification plus the behavioral counseling again. So again, we're back to behavioral correlates of them, of maintenance versus regain.

DANNY LENNON: I wrote an article years ago now at this point on some of the rapid weight loss and different interventions, but there's one there that I remember was the – I think Nackers was the lead author on the trial.

ALAN FLANAGAN: Lisa Nackers, yeah.

DANNY LENNON: And within that trial, they didn't set out, they have people that have different rates of weight loss at the start, but like, they gave them that six months, and then after that, they stratified into people who had lost the smallest amount, the moderate amount, and then the most. I think it was like maybe five kilos in the slow group, and then 13 or 14 in the fast group. And did another follow up at the 18 month period, and the weight regain in absolute amount was pretty much the same as that one or two kilos in all the groups. And so that was one that I tended to point to as – but yeah, there's more of this weight loss upfront, at least in this population of people seem to – doesn't have

this compensatory effect of, oh, you're just going to regain more of that back, because there was more initial weight loss, it seems to actually fit in quite nicely with maintaining long term.

ALAN FLANAGAN: And also, even though at this point, it's only two years of follow up, there obviously will be more, but Roy Taylor's interventions have – and they've looked specifically at responders versus non-responders, and that's not, I should highlight, in the context of weight loss; it's in the context of beta cell kind of restoration of beta cell function. But it has important implications for magnitude of weight loss and regain and again, they use a VLCD, three months on average. But they also have a structured reintroduction phase followed by a structured maintenance phase, so I think, again, we're coming back to the idea that you have behavioral support in the post intervention periods, but you actually have a plan, I think, probably is a stain on a lot of the previous interventions was it's just right, the intervention's over, we'll contact you in two years to see how you've done. But there was no actual idea that, in fact, whatever about the intervention, anything can work. I think most people in nutrition, that aren't married to any dietary belief, would probably accept now that any number of interventions, dietary wise, can work: high carb, low carb, whatever, low fat, high fat, it doesn't matter. What matters is the post intervention phase and the behavioral correlates of it seems getting someone at least over a two-year hump, at which their chances of long term protect, you know, avoidance of total regain exponentially increase. So I think that's kind of quite the important factor, and yeah, there does seem to be a degree of support, that more rapid initial loss can have better correlates with outcomes. And that's because it seems that although a degree of weight will be regained, it will still only be perhaps a third of that which was lost, giving someone still a significant net gain overall, that

may have an important kind of bearing on disease risk reduction.

DANNY LENNON: With that, if we start talking about some of those influences, which, to some degree, we already have, but when we're talking about weight loss maintenance, given at the outset, you talked about those different aspects we need to be aware of when it comes to duration, the amount of the right weight regain, what we would classify as success etc., just to be really clear for people what should we clarify as what weight loss maintenance is? Do you tend to favor – because I know there's different rates that tend to be put out there... ?

ALAN FLANAGAN: Yeah, I mean, I tend to favor the, if we're, again, putting numbers on it, I tend to favor the idea that actual true maintenance is maintenance at say, for example, a four to five year mark post intervention, because I think that's really telling us, because we know that certainly from the LookAhead trial, that there appears to be a stabilizing effect beyond that point. So that appears to be a bit while going beyond two years exponentially increases chances of maintenance, it doesn't necessarily – that increase gets stronger still over time. So in my head, I've kind of settled on five years as a timeframe that I think is most representative, that if someone gets to that point, then the likelihood that that's a kind of a long term kind of baseline stable weight is quite high. And then in terms of magnitude, I would in this context think that maintaining between 5 to 10% is successful if we want to use that word for it. So yeah, 5 to 10% maintained at five years, I think, for me would be a kind of set of characteristics that I would be happy to deem that intervention successful, and in terms of maintenance.

DANNY LENNON: Just to touch on diet composition, I don't think there's a whole lot to be said, and that won't be a surprise, basically we've just discussed, and some of those associations with things like greater vegetable intake, whole grain intake,

dietary patterns that look like the DASH diet, so fruits, vegetables, etc., there's at least something that they tend to correlate with, with weight loss maintenance; but apart from that, they're like, there's nothing particular that I think is distinct here for weight loss maintenance, that wouldn't be the power of any type of healthy dietary pattern, where you're trying to control energy in general, anyway.

ALAN FLANAGAN: Yeah, exactly. I think once you've got those general hallmark characteristics of adequate to maybe higher dietary protein and high fiber intake, I don't really see that the rest matter all that much in terms of ratio of carbohydrate to fat in the diet or with those kind of variables.

DANNY LENNON: Yeah, because, I mean, all you're trying to do from this perspective is what way can this person eat to control energy intake in a way that they can sustain. So yeah, getting sufficient fiber, protein, maybe including low calorie density foods can be useful there. But apart from that, there's nothing too much I think we need to linger on. Probably where there is very strong and compelling evidence is around physical activity, and perhaps where it's the most consistent and clear association where you see that higher levels of physical activity increasing that probability of successful weight loss maintenance. And in those that have, the lower levels are, I think, particularly if they see a decrease in their physical activity over time, that seems to be quite predictive of that weight regain we mentioned earlier.

ALAN FLANAGAN: Right, yeah. Physical activity is probably, I think, it's the most consistent behavioral factor that predicts maintenance and correlates with this idea that we've been talking about, about time spent in maintenance, being a really important determinant, what appears to facilitate that that time spent in maintaining is higher levels of physical activity. And I think the kind of contrast with low levels of physical activity is actually quite stark in that sense. Some people have tried to argue that the

reason high physical activity is effective is because it improves cardiorespiratory fitness, and actually that is something that we should focus on and we shouldn't necessarily focus on, on weight or adiposity. And there's some degree of merit in that, but the caveat I always say is those studies tend to not be in participants with say a BMI of over 35, and so there does certainly appear to be an area, kind of area of BMI, certainly, if we're just using that metrics, which I know is not necessarily great for individual level risk and doesn't factor in things like lean to fat mass and adipose tissue distribution. But in that context, physical activity and cardiorespiratory fitness are important, but I think there's probably a point at which if there is a reduction in adiposity warranted for improving health, that physical activity is not necessarily going to just be having an increase in cardiorespiratory fitness immediately, because that's something that takes time to build. So yeah, I think physical activity just generally as a behavior, like, cardiorespiratory fitness is an outcome, so I think, because I've seen some research that really upplays cardiorespiratory fitness, downplays excess adiposity, I was like, well, actually cardiorespiratory fitness here is an outcome, physical activity remains the behavior. So that's again what we want to focus on.

DANNY LENNON: Maybe the misconception is that high physical activity is simply there to contribute energy expenditure. Of course, it does do that, and that is part of this issue. But if we're also trying to control caloric intake, I think the group out of Leeds, Mark Hopkins has actually been on the podcast before, and I think they've probably done the best work in this area of showing at those low levels of physical activity, once someone becomes completely sedentary, they basically have this inability to properly regulate appetite, and therefore their caloric intake; and I think that's probably at least part of the issue here that if you can keep high physical activity, it may allow better regulation

of energy intake as well, as opposed to just contributing energy expenditure.

ALAN FLANAGAN: Right. Exactly. Yeah.

DANNY LENNON: One of the areas actually I think is going to be where there might be some controversy, and actually relates to the whole discussion we had at the start around, so it's the dichotomy between non-dieting approaches and the kind of fitness industry model would be around self-monitoring, because particularly in relation to self-monitoring of food intake and self-monitoring a body way, they seem to be, again, quite consistently in support of a benefit in terms of long term weight maintenance. But this is probably clearly an issue where we need to dig into some of the nuance and context, especially on an individual level of what we're trying to do, whilst acknowledging that in a large majority of the research, we do see a positive association.

ALAN FLANAGAN: Right, frequency of self-weighing, in particular, is really positively associated with maintenance. It's also controversial now. One of the nuances that I found interesting is that – so one of the arguments is that well, self-weighing will have a negative impact on psychological wellbeing. And we know that poor self-esteem associates with weight controlling behaviors overall. But that is kind of instructive in itself. So one of the things in terms of other psychological predictors is higher self-motivation, and also self-efficacy and internal locus of control. And so when I look at the self-weighing thing, and if it is a risk or not, what speculative assumption that could be made is that in people with those characteristics of greater self-esteem, self-efficacy, internal locus of control, it has a positive effect and potentially will have a negative effect in people who have low self-esteem. But again, this comes back to the idea of screening, because I would argue, based on some of the other research, that these behaviors could likely be present prior to an

intervention. But the idea that it is a ubiquitously negative behavior with negative consequences is just not the case. We know that there are regular self-monitoring of waste. It can be evident in terms of maintenance for up to a decades. So it's a potentially problematic behavior for some individuals, if the appropriate level of screening is not undertaken prior to an intervention.

DANNY LENNON: Yeah, and I think the important thing for practice here is to remember that even when we're talking about this being correlated with a benefit for long term weight loss maintenance, remembering what is defined as like success, as opposed in those studies is, does this person remain a certain way, not necessarily are they psychologically healthy and happy and so on. And I think, again, from practice, most practitioners will have tons of experience with people who are not going to respond well to either weighing themselves regularly or even at all, or even monitoring food intake in some of the typical ways that is done. And, like you say, a screening process for that in practice to make sure we're not trying to fit everyone to the same mold where it's going to be maladaptive and problematic is important. Like really, in the long term, what we want is people having clear behaviors with less and less tracking, and maybe be able to cultivate that internal locus of control without needing an external parameter like a bodyweight measure that they can still feel in control and still feel the self-efficacy without the need to back that up with an objective piece of data, they can do some more on some of their internal cues.

ALAN FLANAGAN: Right. And this is part of the difficulty navigating the kind of, I guess, battle between the just general fitness industry model versus non-diet approaches is we can be seen – and I sure I may be sound right now like I'm kind of completely discounting risk, and I really want to emphasize I am absolutely not, I'm trying to emphasize that there is risk to dietary interventions, and that they need to be

appropriately factored into any assessment. I think that's the important kind of point to try and hammer home, I'm not just assuming that this is a benign intervention, and well, frequency is of self-weighing is going to be fine in all people if it comes back to appropriate screening. What I'm not going to do, which is the other side of the fence, is assume that this evidence just isn't there, because it is. So I think it's just about trying to bring this dialogue back to some place of objectivity, which has been a real challenge because factors like weight stigma and the really maladaptive and debilitating effect that that has on people at an individual level and societies, I'm not questioning any of that. But I don't think it's helpful either to, as a lot of this conversation has got to a place of almost denialism about weight science.

DANNY LENNON: Because I think there's a lot to be said for, okay, we can acknowledge that this finding is here, we can now just look at why is that potentially the case, and then you've lots of interesting questions to explore as to what might explain that. So I do agree with that. And then on, again, a practical side for practitioners, it's, I think there's a way of having a discussion about what a bodyweight measurement means that can kind of at least mitigate some downsides, that it's just a proxy measure for something else, and there's no inherent value that needs to be placed in that and it can be completely divorced from any self-worth and identity. Now again, saying that to someone is one thing, someone believing that is different, so it may be completely contraindicated for many people, I completely get that, and that's why not everyone should do it. But there's also a way you can frame it as being able to disassociate this being anything that reflects any value or as anything other than a proxy for something else, like, the actual body weight doesn't matter in nearly every case, apart from if you're a weight class based athlete, then it matters for three days of the year.

ALAN FLANAGAN: Right, yeah.

DANNY LENNON: So maybe let's just round off and like everything we've said and tie that into something practical takeaways, if we can. What are some of the main things that when you look at this area of research are our most clear to you, and are the things you would tend to pass on to people the most?

ALAN FLANAGAN: Well, the first thing is, I think taking the whole area as a whole, yeah, there's no denying that there is an overall kind of lack of very quality, robust evidence for long term maintenance. But that seems to relate to the level of behavior change and intervention that's required to sustain that. It doesn't mean that there's no evidence, and there is. Within that evidence, what is really clear is that the factors that tend to positively associate with maintenance are intensity of the intervention in particular, total number of – and by intensity, I mean total number of actual practitioner contacts with a healthcare professional with a multimodal approach being preferable. So total contacts and frequency of contacts. The rate of initial weight loss may be a factor that improves outcomes, although that's not necessarily entirely consistent. The shifting of increasing numbers of behaviors and physical activity, self-weighing when it's not maladaptive, and dietary modification appears to really kind of fall like a distance, I wouldn't even say a distant third, but a distant factor behind all of these correlates We do also know on the flip side that weight regain may be predicted by higher levels of maladaptive behaviors at baseline, so indicating that participants may also be struggling with restrained eating or disinhibited eating, low self-esteem, poor body image, and low kind of self-efficacy, internal locus of control, and so those factors are really important because like it's not, I don't think, ethical of us to put people that score on any of those measures into a weight loss intervention, but that's really what the research community has been doing for 30 years. So the point is that

there does, while the actual psychological predictors of weight loss are not all entirely consistent, there does appear to be a delineation in terms of some of the factors that predict weight regain, and some of the factors that predict success. And in addition to those behavioral correlates of successful maintenance that I just mentioned, the two factors that I think are really important are duration spent in maintenance, and the frequency of practitioner context, both of which relate to each other. And for that time period, I think, really the two to five-year mark post intervention is probably most kind of instructive in terms of where maintenance seems to stabilize.

DANNY LENNON: I would also echo the need to, on an individual level, consider is a weight loss intervention, a good idea for this given individual or not, and I think a lot of people can benefit from having that as a screening question early on. Secondly, like you said, if there is signs of some of those psychological issues, which may undermine their potential success in the future with weight loss maintenance, that could be a good place for a referral to a professional within psychology. And then I would say, in terms of long term weight loss maintenance, where that is desired and where someone is going to go with that, realizing that weight maintenance is actually a range of weights that you're going to fluctuate between, as opposed to, you hit 75 kilos, instead 75 kilos, it's probably a number of kilos. And there's different ranges here, I think I cited a 3% range, but there's others that would be like 5%, but having some sort of range, that is normal on any given week, month, or long term, where weight can stay within, and we're still going to include that as weight maintenance. So those be a few things I would say, and then maybe finally from a practical perspective, at least anecdotally, it seems that it's beneficial to have a gradual move from a weight loss intervention into long term weight loss maintenance. And that kind of mitigates the problems that you highlighted

earlier, when someone finishes a weight loss intervention, and now just go off and do whatever you want to do tends to be problematic, whereas not only having a plan for a weight loss maintenance specific period of time, but there's even some of the review papers talked about cases where even people were counseled a couple of times about long term weight loss maintenance, they had better outcomes than if they had been told nothing. So they weren't even given follow up support, they just did one off session at the end of their weight loss intervention, and they still had better long term weight loss maintenance outcome. So I think all of that ramble hopefully makes some degree of sense, but I don't know if there's much else of I would be saying there.

ALAN FLANAGAN: I don't think so.