

Guru Performance Position Stand #3 – Effective Weight Management

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(1) INTRODUCTION

Following the Christmas period, it is likely that many people will look for ways to 'get in shape'; most probably because of the inevitable onslaught of calories that are an inherent part of the festive season. Whilst there are many outlets of information proposing 'the most effective diets and strategies for weight management', it is apparent that these discussions found on social media, blogs and even in the scientific literature on the very topic have become somewhat chaotic due to the misuse of terms used to describe aspects of weight management and energy balance. The main objective of this position stand is to put the evidence that best characterizes weight management strategies into perspective, and believe it or not it's simpler than you might imagine. We will discuss the underlying principles of weight control: what we know, what we still *don't* know, and how this information can be put to use in a practical sense.

(2) UNDERSTANDING ENERGY BALANCE

To discuss weight management, it is first critical that we define the underlying principles that dictate fluctuations in body weight, as well as define some key terms as they relate to energy balance. Fortunately for us, the laws of physics haven't changed much for a long time. The laws of thermodynamics still hold true and a calorie still really is a calorie in the sense that it is a unit of measurement for energy in the context of

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nutrition. To avoid confusion, the calorie as it relates to nutrition is expressed in kilocalories or kcals (1000 calories = 1 kcal). Herein, we will only refer to energy as 'kcals'. Body mass is mostly a function of how many kcals (energy) we consume versus how many we burn over time, and this concept is known as the energy balance equation, expressed below.

Energy storage = energy in – energy out

Let's quickly remind ourselves that the major macronutrients of the human diet are carbohydrates, fats and proteins (and hopefully to a lesser extent, alcohol!); each of which have an energy value (carbohydrates; 1g = -4 kcal, fats; 1g = -9 kcal and protein; 1g = -4 kcal, alcohol; 1g = -6.9 kcal), which is the metabolisable energy or the energy actually available from a macronutrient for biological processes. If one is to lose body weight then it is necessary to burn more calories than are consumed and conversely, if one is to gain weight then more calories must be consumed than are burned. This is complicated slightly by the properties of different foods, which we will cover in further detail later. It should be clear by now that the calories we **consume** are simply those derived from the diet (foods and beverages), whilst the calories we **expend** are composed of three main components - as defined in the table below.

COMPONENT OF ENERGY EXPENDITURE	DEFINITION
Resting metabolic rate (RMR)	The energy needed to simply keep you alive. Breathing and various metabolic processes require energy and this constitutes the RMR.
Dietary Induced Thermogenesis (DIT)	Eating disturbs homeostasis in the sense that energy now needs to be used to digest and process the food we eat. It can be thought of as the 'investment step' of nutrition whereby energy is invested to digest the food that will pay out with a greater amount of available energy. Typically, it is around 8-12% of the energy value of the food eaten depending on its macronutrient content.
Physical Activity Expenditure (PAE)	This is the most variable component of energy expenditure. Simply put, more activity will mean more PAE and different physical activities and exercise modalities will result in different amounts of energy being expended to fuel that task.

Accordingly, when we talk about energy expenditure what we are actually referring to is a **combination** of these three components. Now that we have defined some key terms, we can discuss how they fit together and can be manipulated to control (manage) body weight.

(3) INTERACTIONS BETWEEN THE COMPONENTS OF ENERGY BALANCE

Energy storage in the body reflects the overall changes in stores of carbohydrate, protein and fat. Carbohydrate is stored mainly in the form of intracellular glycogen in skeletal muscle and liver. The total amount of stored glycogen is relatively small (~1% of total energy). Protein has many forms in the body and so is stored in most tissues, with the main storage site being skeletal muscle (~15% of total energy). Fats are stored in the form of triglyceride, which is the largest source of stored energy the body (~84% of total energy). If the utilization of these stored energy sources changes and this results in a chronic imbalance, then body weight will change. Crucially, the body is adapted in such a way that as excess calories are consumed, the preferential way to store that energy is as triglycerides (a smart evolutionary adaptation to ensure that humans could hold on to energy for times when food was scarce).

It is crucial to remember that storing and using energy is dynamic and, therefore, **time** plays a huge role in determining energy balance, and thus meaningful perturbations in body mass! If we take just a 24-hour snapshot, a person will eat a number of meals, which result in a positive energy balance after each meal. Then, they might perform physical activities and so energy expenditure increases. As such, energy in and out is constantly in a state of flux. It's unlikely that a person has the exact same 24-hour pattern, and so even day-to-day energy balance changes! The key message here is simple; energy balance is determined over a prolonged period and, as such, body weight changes reflect this i.e. **they take time**.

"IT'S CRUCIAL TO REMEMBER THAT STORING AND BURNING ENERGY IS DYNAMIC AND TIME THEREFORE PLAYS A HUGE ROLE IN DETERMINING ENERGY BALANCE"

So far we have covered the basics of energy balance and how they relate to body weight fluctuation, and introduced some important concepts that are fairly straightforward to understand. But the body is a fascinating, highly organised biological machine and so although the fundamental idea of calories in vs calories out does a good job of explaining weight control, the body has some pretty smart mechanisms to control the limits of this system. What we're talking about are **compensatory mechanisms**. Two key examples are as follows; it is established that a greater amount of body mass results in a higher RMR thus as we gain mass (muscle increases RMR more than fat) we have an increased need for calories, which is considered a **passive mechanism**. There are also **active mechanisms**, such as an increase in food and fluid intake that has been reported following exercise (Rocha et al., 2013). This can become quite a big topic for debate, so we will bullet point the main interactions that occur between the components of energy balance.

- 1. Exercise impacts upon energy expenditure and intake: When exercise adherence is controlled in a laboratory trial, there is still a large variation in the daily energy expenditure values between people (Donnelly et al., 2003). This means some people lose a lot of weight whereas some actually gain weight with the same intervention. How is this possible you might ask? Well, some of this variation is due to how each person compensates for his or her energy expenditure from exercise with food intake. Differences in appetite after exercise may partly explain such variation in feeding after exercise.
- 2. Eating influences subsequent food intake: The composition of meals eaten affects satiety (the feeling of fullness) and therefore impacts upon subsequent feeding. Protein results in the best satiation, so a meal rich in protein keeps you feeling fuller for longer. However, if one likes or wants food this can in fact outweigh the feeling of hunger and so it is important to pay attention to how an individual feels about food in addition to meal composition.

3. Food intake affects energy expenditure: When one restricts food intake, less energy is generally expended (Martin et al., 2007). As we've discussed, a calorie deficit leads to a loss of body weight (this could be both muscle and fat, depending on the intervention). Muscle and fat are metabolically active, so as we lose it the RMR decreases. A parallel with this, the TEF is reduced because less energy is needed to process nutrients (for example, protein synthesis and degradation that occur after eating protein). Conversely, when one overfeeds, energy is stored and weight is gained. This leads to increased RMR, increased PAE and increased TEF.

(4) GETTING IT RIGHT: TOTAL, TYPE AND TIMING

To bring this review right back to a basic, practical position, we believe that the complexities of weight management can be untangled by following some simple principles that relate closely to energy balance, which is the so-called 'master regulator' of body weight. They are; **total**, **type and timing**. What they refer to is how much you eat (total), when you eat it and the frequency at which you eat it (timing), and the macronutrient composition of what you eat (type). By manipulating these variables, one can develop sustainable eating habits that allow control over body weight.

If we first consider total, this means on a daily basis how many calories are being consumed. It's important because as we've learned earlier, an imbalance between calories in vs calories out underlies weight fluctuations. Setting a target for total forms the first base in designing a nutritional intervention for weight management. For a working example, let us consider the hypothetical 30 year-old male described in the figure below.

Body mass	(kg)	Lean mass (kg)	Fat Mass (kg)	Energy Expenditure (kcal)	Energy intake (kcal)
100		73	27	total = 2,776	total = 4,620
•				RMR = 2,106	from CHO = 2,400 (6 g/kg body mass)
				DIT = ~460	from fat = 1800 (2 g/kg body mass)
				PAE = 210	from protein = 400 (1 g/kg body mass)
185 cm				 Sedentary lifestyle Motivated to change Mild insulin resistance No cardiovascular or metabolic diseases 	

The first thing that should jump out is that he <u>has an energy imbalance</u> – he is consuming more calories than he is expending each day, which has resulted in these excess calories being stored as fat in adipose tissue (27% body fat). He has a relatively low amount of dietary protein, too much carbohydrate for the amount of physical activity he is doing (with much of it coming from sugars) and a little too much fat (of which aren't from good sources). The best way, in our experience, to approach this practical problem is to first reset **total**. Let's assume we prescribe more exercise to his daily regiment for a start (he is not keen on long steady state training but complies with doing HIT sessions and finds them enjoyable), plus advise more non-exercise activity (taking the stairs instead of the lift, walking to the shops instead of driving etc.) and so his PAE is

increased, pushing his total energy expenditure to \sim 3,200 kcal. We now need to cut the calories in the diet to approximately 300-500 kcal below what he is expending in order to lose body weight, so we set the target at \sim 2,800 kcals. Let's now break this down into the totals for each macronutrient.

- 1) It makes sense to try and maintain as much lean mass as possible whilst in an energy deficit, so protein should not be compromised. Recent research has shown that it is indeed possible to maintain or even gain muscle mass whilst in an energy deficit (Longland et al., 2016), and that maintaining a high protein intake (2.4 g/kg of body mass/day) was more beneficial than lower protein intake (1.2 g/kg of body mass/day) in promoting increases in lean mass and losses of fat mass when combined with a high volume of resistance and anaerobic exercise. So the first thing we could change in our theoretical clients diet is his protein intake, increasing it to ≥ 2 g/kg of body mass/day.
- 2) Next, we can decrease the contribution of carbohydrate slightly because even with an increase in physical activity, our client does not need a lot of carbohydrate to meet such energy demands. Note: we do NOT advocate a zero or 'very low carb' diet. Instead, it might be sensible to suggest ~3 g/kg of body mass/day for our individual. To better grasp the requirement for carbohydrates, see our Guru Performance podcast with Trent Stellingwerff (Episode 45 'Carbohydrate Periodization'; http://guruperformance.com/institute/podcasts/).
- 3) Despite the beliefs of many, not all fats are bad and should certainly not be avoided (although the type is important, which we will discuss later). Approximately 0.8 g/kg of body mass/day of fat is good target for our client and this will allow him to keep his calories where they need to be whilst permitting the intake of healthy fats.

*Quick calculation: carbohydrate @ 3 g/kg = 1,200 kcal + protein @ 2 g/kg = 800 kcal + fats @ 0.8 g/kg = 720 kcal = total energy intake of 2,720 kcal per day... looking good!

We can now focus on resetting **type**. The first message that we believe to be the most important here is that the diet should always put 'food first'. Substituting meals for meal replacement products will never provide the nourishment or satisfaction of real food. Carbohydrates should be sourced from fibre rich sources that ideally are not processed and typically should be low in sugar. For meat eaters, protein should be obtained from a variety of sources including white meats, red meats and fish. Different types of meat have different health promoting properties and different types of protein, for example; the protein in white meat such as chicken can be quite rapidly digested and absorbed whereas the casein protein in milk is slowly digested providing a sustained release and therefore useful to consume before bed (Snijders et al., 2015). Variety is an important factor in protein choices. Finally, fats should come primarily from poly-unsaturated and monounsaturated sources, whilst trans fats should be avoided where possible as these fats are most heavily associated with adverse health outcomes.

Timing plays less of an influential role when compared with total and type. Some studies show that the influence of the pattern of feeding offers little difference in terms of weight fluctuation between different feeding patterns provided the total calorie intake is the same. Conversely, maintaining regular feeding patterns can help to increase the TEF and lower glucose responses, both of which would benefit weight management (Alhussain et al., 2016). A factor that makes sense to time effectively in the context of weight management is protein. For protein, doses of 20g consumed at 3-hour intervals are more effective for stimulating the production of new protein in muscle than more frequent and smaller doses or less frequent and bigger doses (Areta et al., 2013). Since we know protein provides a greater feeling of satiety, it may also prove effective at reducing feelings of hunger throughout the day. Additionally, timing some protein intake before bed is an effective strategy to stimulate and preserve muscle mass during sleep (Res et al., 2012). Since more muscle mass results in a higher RMR, this can benefit both exercise adaptations and maintenance of an energy imbalance, useful when reduced body fat is a goal.

(5) DISSECTING FAD DIETS

As we have explored the fundamentals of a good weight management practice, it's appropriate to touch upon poor practice in order to avoid it, which typically comes in the form of 'fad diets'. Fad diets are fads for a reason; they are not effective over the long term! Even those of us with the most basic exercise physiology and nutrition knowledge are aware that it is simple to rapidly lose weight, but keeping that weight off and maintaining a sustainable lifestyle is the hard part. This is why so many diets come and go and is a primary cause of the confusion and bad information being fed to the public. It is tempting to buy-in to a scheme that will help you quickly lose weight, but being mindful of the cons will result in better long term weight management.

"FAD DIETS ARE FADS FOR A REASON; THEY ARE NOT EFFECTIVE OVER THE <u>LONG TERM</u>!"

What are the key features that are common in most fad diets?

- Extremely low carbohydrate intake (<50g per day): a debate in itself is the usefulness of extremely low or 'ketogenic' diets. We believe based on current evidence that that carbohydrates should be matched to the amount of physical work that needs to be done. They're an important energy source for the muscle, immune system and brain and shouldn't be avoided. Moreover, a recent study has suggested that, calorie for calorie, fat restriction results in more body weight loss than carbohydrate restriction (Hall et al., 2015) providing evidence that cutting carbs isn't all its cracked up to be. Being carb smart is a better approach (same goes for fats!).
- **Reliance on meal replacements:** meal replacements cannot and will not trump whole, fresh foods. If they claim to offer the same nutritional value as, say, green vegetables, then eat green vegetables!!
- Lack of variety compromising the breadth of nutrient intake: fad diets often rely on omitting nutrient dense foods and often depend on supplements to achieve the necessary intake for micronutrients. This is not necessary, as variety can still be achieved on a reduced calorie intake!
- Lack of adaptation to the new 'settling point': because fad diets often rely on extreme and nonsustainable lifestyle changes to achieve rapid body composition changes, when a new settling point is reached (i.e. body weight is lost), it is difficult to stay there. Hence, fad diets soon die out as the consumers realise that it is too difficult to adopt long term.
- Lack of education compromising self-sustainability in the long term: in our experience, we have come to find that one of the keys to sustainable lifestyle change is acquiring some basic knowledge about food (the three T's we discussed earlier are a great skeleton for implementing this information) and lifestyle coaching. Knowing when and what to eat without reliance on a manual allows for more informed decisions to be made that, in turn, become new habits. See more about the educational aspect of weight management in section 7, below.
- Lack of cognitive-behavioural considerations or coaching: as discussed in the next section, everyone is different in the way they perceive and mentally cope with dietary and lifestyle change. Assessing and monitoring psychological factors that relate to lifestyle change is an often overlooked, but very important aspect of weight management. Fad diets and buy-in schemes rarely, if at all, offer cognitive-behavioural strategies.

(6) PSYCHOLOGICAL ASPECTS OF WEIGHT MANAGEMENT

Our commentary so far has explored the biological aspects of weight control, but where many research studies, case reports and advice from practitioners fall short are in their failure to consider the psychological



component of weight control. A point that is often overlooked is that making drastic changes to someone's diet and prescribing a text book meal plan often leads to a lack of adherence.

The first step to successful weight control is to understand the factors that will ultimately shape adherence to the lifestyle change. Weight management in the context of *losing* weight relies on energy restriction. What fad diets and blanket meal plan approaches fail to consider is that **eating is a social activity**. The implication of this is a fundamental consideration! People do not just eat to satisfy hunger, rather there are additional facets that promote eating such as emotions, motivation and social pressures (American dietetics association, 2009). It is understood that being able to restrain from

food, fantasising about food and binge eating are all good predictors of obesity (Delahanty et al., 2002), which suggests that significant attention should be paid to **training behaviours**, as well as educating and directing food choices to make a weight management intervention successful. In fact, research is beginning to focus on methods to improve food restriction, self-esteem and tolerance to the perceived discomfort of not eating. This highlights that the importance of behavioural coaching is becoming more valued in the pursuit of effective weight management interventions. To summarise, you might be able to prescribe the most scientifically sound, theoretically perfect diet and exercise programme but without understanding and accounting for psychological factors, you will have limited to no long-term success.

(7) GENETICS AND WEIGHT MANAGEMENT

Our final point of discussion is the widely misunderstood area of genetics. Since genetics do indeed play a role in body weight, we feel it is necessary to address this issue. Human genetics is an intricate topic to explore, so covering all of the detail is not in the scope of this position stand, but there are some key take home messages to help put some myths to bed and bring truths to light.

A common phrase we often hear is; "I can't lose weight because of my genetics". What does this mean and is there truth in the statement? A persons' genetics, known as their 'genome', is each person's full set of genes that controls everything a person is and is capable of becoming. A single gene has the information needed to make a protein, but there may be more than one-way that gene is 'written' to make the same protein. As such, each person can differ to another in almost all aspects of their biology.

So is it true then that body weight is controlled simply by ones unique genome? Not entirely. Think of genes as being 'opportunistic'. It is true that certain genes are <u>associated</u> with fat storage, such that some genes lead to a very lean body type whilst others pre-dispose towards an obese phenotype (Volckmar et al., 2016). However, how these genes manifest is also related to **environmental factors** such as diet, exercise, stress etc. In context, if we provide an environment that is conducive to obesity, those pre-disposed genetically to be obese will show the most drastic increases in body fat (check out Guru Performance Podcast Episode 89 – 'Personalised Nutrition' with James Betts PhD and Javier Gonzalez PhD for insightful discussion on this aspect).

"DON'T ASSUME ALL PEOPLE WILL RESPOND THE SAME AND ALSO REMEMBER THAT ENVIRONMENTAL FACTORS MAJORLY INFLUENCE THE POWER OF GENETICS"

What is the key message on genetics and weight management? Genes are not the sole determinant of body weight nor should they be completely discounted. They will interact with other **controllable** lifestyle factors to determine the overall outcome of an intervention. Knowing this is important because it means that we should treat each person as the individual that they are (it's not just who you are but more so **what you do** [Betts and Gonzalez, 2016]). Understanding how one responds to exercise and different foods allows for an adaptive approach that maximises the effectiveness of an intervention on a person-by-person basis but this is determined through testing actual diet and exercise responsiveness on a test-re test basis rather than by genotyping. At present, very little robust evidence exists to suggest genotyping can direct a diet and exercise programme. Don't assume all people will respond the same and also remember that environmental factors (i.e. diet and exercise) **majorly** influence the power of genetics.

(8) PRACTICAL APPLICATION

Hopefully by now we have convinced you that weight management can be quite simple. We also hope that you realise the idea of 'the best diet' is erroneous because diet and weight management is highly context dependent. Dietary extremes dressed as fad diets are dangerous and will not result in long term weight management control or health benefits. We've summarised our thoughts from this position stand into some bullet points below.

- Every individual should be assessed on a personal basis; No one person will present the same scenario. Snapshot measurements that should be considered include as they strongly affect responsiveness to an intervention include: pregnancy, allergies and diseases, adiposity and age.
- Do not rely on genotyping to determine the type or amount of foods or exercise one should do. We simply do not have enough information linking genes with responsiveness to nutrition outside of extreme cases (rare) where specific gene variants strongly relate to leanness or obesity. For most people, what you do is a better predictor of ones needs than who you are.
- Psychological assessment is an invaluable tool to create and monitor an effective weight management plan. Such cognitive-behavioural approaches include systematic observation and recording of target behaviors, for example; reduced calorie intake and increased daily exercise. Enhancing **selfawareness** and focus through the use of daily journals and fitness/activity trackers are useful exemplary tools. Similarly, likes and dislikes related to exercise and nutrition should be key factors in intervention programming as individuals won't adhere to diets and exercise that they do not like!
- To achieve desired changes in body weight, focus should be placed on energy balance. Target the daily calories needed to achieve an imbalance and implement this by manipulating the total amounts of protein, carbohydrates and fats. Increasing non-exercise activity and exercise further increase energy out. A number of practical food tracking/planning apps can be highly useful to help develop desirable behaviours.



Figure adapted from Addy et al. (2015).

(9) CONTEXT STATEMENT

Each person is unique. We all have a unique set of genes and a unique psychological profile. We acquire personal tastes and preferences over time and our complex modern lifestyles affect our likes and dislikes which often can place obstacles in the way of the lifestyle we wish to have. Embracing the reality of these differences and productively factoring them into a sensible and practical lifestyle strategy will most likely yield the best results i.e., a sustainable healthy lifestyle that allows relative control over body weight. It's not always easy and it can be tempting to buy into a "fat loss in fifteen days" quick-fix type of plan, but in the long term such fads usually fail. For these reasons, there is no "best diet", just what works best for 'you' for the long term! Stick to the evidence-based basics of energy balance and 'hit' macronutrient targets with whole-nutrient dense foods. If you struggle to grasp weight management, our best advice to you is to consult with a registered dietician or registered nutritionist. If you are very active; then seek out a fully qualified sport and exercise nutritionist (i.e. a SENr registered practitioner in the UK) or sports dietician to help you develop a strategy that works for you.

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Podcasts

- Episode 45 'Carbohydrate Periodisation' with Trent Stellingwerff PhD http://guruperformance.com/episode-45-carbohydrate-periodization-with-trent-stellingwerff-phd/
- Episode 89 'Personalised Nutrition' with James Betts PhD and Javier Gonzalez PhD <u>https://guruperformance.com/episode-89-personalised-nutrition-with-james-betts-phd-and-javier-gonzalez-phd/</u>

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GURU PERFORMANCE

GURU PERFORMANCE POSITION STAND #3 - EFFECTIVE WEIGHT MANAGEMENT STRATEGIES by Daniel Owens, Scott Robinson, and Laurent Bannock







effective nutritional strategies for weight management. Often, there is conflicting information which can lead to confusion on the matter

We all have a unique set of genes and a unique

psychological profile. We acquire personal tastes

and preferences over time and our lifestyles

affect our likes and dislikes. For these reasons,

there is no 'best diet', just what works best for

you, for the long-term! Stick to the evidence-

based basics of body weight regulation (i.e.,

energy balance, total > timing > type) and if you need advise then be sure to consult with a

registered dietician / nutritionist. If you are very

active, then seek out a fully registered sport and

exercise nutritionist (i.e., a SENr registered practitioner) or sports dietician to help find a

strategy that works best for YOU!



The truth is, many nutritional strategies will work provided the fundamental principles are in place. Energy balance is the 'master regulator' of fat loss, so if a strategy places an individual in a negative energy balance (more energy is expended than ingested), this will promote fat loss



However, many diets (particularly so-called

'fad diets') do NOT promote optimal health or well-being, are difficult to adhere to and sustain over the long-term, and can negatively influence day-to-day as well as exercise performance. *Health and wellbeing should always be the priority of any intervention!

of long-term success (ADA, 2009!



*This infographic provides an overview of the key points covered in the Position Stand article. To ensure a comprehensive understanding of the topic we encourage readers to read the full article and watch the overview video.

(namely: diet, exercise and stress; Volckmar et al. 2016)



The most effective nutritional strategy for body weight regulation is one that considers TOTAL > TYPE > TIMING

TOTAL amount of calories and macronutrients (carbs, fats, proteins) ingested. This is the most important consideration for body weight regulation. TIP: Usually, there is no need to restrict one macronutrient (i.e., carbs or fats). Both are important for health and well-being. Just be sure to consume in moderation (in line with you bodies needs).

TYPE of macronutrients ingested. Ensure you consume a variety of sources to help promote optimal health and well-being. Where possible:

CARBS - choose unprocessed options, preferably low in sugar.

FATS - opt for mono- and poly-unsaturated fats. Some saturated fat is OK. Avoid transfats where possible.

PROTEIN - opt for a variety of sources. Good choices include: white and red meats, fish, eggs, yoghurt, milk and cottage cheese.

TIMING - plays less of a role in body weight regulation than the total and type. However, regular protein feeding (including pre-sleep protein) may help preserve muscle mass during periods of energy-restriction.

Read the full article at: www.GuruPerformance.com