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Vogel, E.

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Metabolism and Movement: Calculating Food and Exercise or Activating Bodies in Dutch Weight Management

Else Vogel

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Abstract

In this article, drawing on ethnographic fieldwork in the Netherlands, I explore how weight management practices adapt scientific knowledge to the pragmatics of daily life. I contrast two 'metabolic logics': one premises calculating food and exercise to ensure energy balance; the other, operating as a critique to the first, puts its hope in activating people's metabolic rate. Metabolic logics, I stress, do not just present ideas on bodily functioning. They are also and importantly a practical and material affair. The first approach incites a desire and sense of responsibility in people to have control over and correct their bodies, while the second, foregrounding less measurable forms of health, hinges on a person's responsivity and trust in other active entities. Metabolic practices do not merely follow scientific insights into how fat comes about; they include estimations of what knowledge is helpful in daily life when overweight is a concern. However, innovation is difficult, as in exercise machines, recommended dietary intakes or diet shakes, figures of food as fuel and bodies as machines stubbornly sediment. In conclusion, I suggest that when 'thinking metabolically' we address metabolism as part of the socio-material practices that narrate eating, bodies and moving together in particular ways.

Keywords: *exercise, eating, metabolism, health promotion, food, body*

How do eating and moving relate? In the context of the reported ‘obesity epidemic’ in the Netherlands¹, in which health is increasingly equated with ‘a healthy *weight*’, their relation seems straightforward: people are getting heavier because they eat more and move less. It follows from this apparent lack of movement that people need to exercise more. How does this seemingly obvious truth translate into practice?

Drawing on long term ethnographic fieldwork in the Netherlands², this article explores how knowledge inflects consumption, focusing on exercise practices in which there is a primary concern with weight.³ My concern is with the different modes of relating to one’s body that are offered in these practices. That is, with how knowledge structures particular ways of healthy living, rather than others. The idea that ‘exercise is good’ fuels many Dutch health care practices, diet and exercise regimes, and obesity prevention programs. Likewise, the concern with weight, strengthened by both health and cultural/aesthetic norms, contributes to people’s attempts to make ‘healthy changes’ in their lives. But although the basic idea that ‘moving is good’ was usually taken for granted in my fieldwork, there were different accounts of what good it does and for what.

Below, I articulate and contrast two ‘metabolic logics’: two more or less coherent, but strikingly different notions of how eating and exercise may change bodies and lead to health and weight loss. One emphasizes ‘*calculating*’, the other ‘*activating*’. I investigate how the knowledges, metrics and techniques that come with these metabolic logics both transform practices and are transformed there in situated ways. My concern is primarily with the different modes of relating to one’s body that are offered in these practices. These logics, I stress, do not just present *ideas* on what is healthy or not. They are also and importantly a practical and material affair. That is, they structure particular ways of healthy living, rather than others.

Dietary management and metabolism(s)

In the Netherlands, weight care is to a large extent located in the clinics and consultation rooms of doctors, dieticians and other clinicians such as weight consultants. These health care practices, however, though important, are but a fraction of the range of possibilities offered to people who want to, or feel they ‘need to’ lose weight. It is, for instance, very likely such people will try one or more of the many commercial weight loss products promising swift weight loss, often with little effort. People try mindful eating, opt for shake diets, attend programs like Weight Watchers, start with various exercise regimes or watch and learn from celebrity chefs on television. There are community programs that facilitate exercise in the neighborhood and local gyms that offer nutritional advice and help their members reach their ‘goal’ of weight loss. Consequently, various credentialed and non-credentialed forms of expertise circulate, including the knowledge and methods people themselves develop in their attempts at weight loss or healthy living.

The knowledges, metrics and techniques circulating in this field were not always deployed in the context of weight management. As is well described, dietary management emerged out of typical industrial concerns with productivity and labor. For governments and employers, the measurement of the calorie presented scientific “standards of living” that contained wage levels while maintaining a healthy, productive workforce (Cullathar, 2007). Recommended dietary intakes (RDI) have their origin in a similar early nineteenth century context where such ‘dietaries’ had to ensure that the nutritional needs of inmates and patients were met (Mudry, 2009). The industrial metabolism of a 19th century biology concerned with labor and efficiency models the body after the factory (see also Rabinbach, 1992). As science historian Hannah Landecker (2013) details, it mirrors a theory of value in which raw

materials are converted into manufactured goods, presenting pathology as disruption due to broken parts in the productive machinery.

Recently, anthropology, Science and Technology Studies (STS) and other social sciences have seen an increased interest in ‘metabolic relations’ (Abrahamsson, Bertoni, Ibáñez Martín, & Mol, 2015; Bertoni, 2013; Cousins, 2015; Guthman, Broad, Klein, & Landecker, 2014; Kendrick, 2013; 2013; Levin, 2014; Solomon, 2016). This interest emerges from concerns with ecology and food production as well as with the politics and effects of the increase in “metabolic ailments” of the modern world, such as obesity and diabetes. Current social scientific attention to metabolism, moreover, runs parallel to changing ideas in the field of biology on what metabolic processes are and do. As Landecker argues: concerns have shifted from how *matter transforms through bodies* to how *bodies transform through matter*. Rather than broken parts, postindustrial pathologies are regulatory crises (2013: 496). New scientific understandings of food and bodies complicate the values embedded in industrial models of metabolism (ibid, 2011). Part of the current appeal of ‘thinking metabolically’ is its challenge to Western assumptions about embodiment, cognition and control (Kendrick, 2013; see also Wilson, 2015).

My own concern is with the ways that certain accounts of metabolic relations, in relation to certain health concerns, shape consumption. Even in postindustrial times, figures of bodies as factories and food as building blocks are built into techniques of knowing, shaping and restricting the contemporary foodscape and its effects on the body. Calories, for instance, carry the traces of their conditions of production in a previous era. Yet in contemporary accounting practices they emerge as part of different normative projects (de Laet, 2017). In the process, exercise – a substitute of labor – became a part of metabolic practices. ‘Working out’ is a way to intervene in the conversion of food into matter and energy.⁴ It is not just food that has been grown and bodies that have been fed by particular

metabolic logics (Yates-Doerr, 2015a), but also people's desires and hopes for their bodies and the techniques that are made available to them. In the practices I studied, these feelings are central.

In this article I trace how knowledge – as a practical *technique* – patterns experiences and meanings of wellbeing, health and the practical specificities of eating and exercise. By and large, scholars have emphasized the rationalist and calculative logic built into the techniques proposed in public health agendas (Greenhalgh, 2016) and in commercial weight loss programs (Darmon, 2012; Heyes, 2006). For instance, philosopher of science Gyorgy Scrinis argues that current approaches to healthy food are infused with an ideology of 'nutritionism'. Nutritionism holds a reductive account of the nutritive qualities of foods and the evaluation of their effect on the body, for instance by quantifying the nutritional content of food while designating some macronutrients such as protein 'good' and others such as fat or carbohydrates 'bad' (2013).

Rather than describing the world, knowledge is thus prescriptive and performative of certain modes of being and doing. However, I foreground that techniques unfold in locally specific ways. As others have shown, "nutrition-in-action" (Yates-Doerr, 2012b) and "practice-in-the-making" (Ferzacca, 2000) allow for various, idiosyncratic strategies and modes of relating for both professionals and patients/clients. Moreover, knowledge is not coherent and different kinds of knowledges contribute to different enactments of bodies, selves and food. In practices we see that *what* facts and sciences are drawn upon turns out to be of pivotal importance in what constitutes 'healthy living' (Mol, 2013). Therefore, I am careful not to analyze 'biomedicine' as a monolithic set of practices and discourses representing 'health according to science'.

Working from a material semiotics approach, a set of sensitivities emerging from Science and Technology Studies (STS), I analyze *modes of ordering* (Law, 1994; Moser,

2005) practices. That is, I explore how a certain ‘metabolic logic’ emerges from a practical arranging of people and things – of subjects, bodies, environments, techniques, professionals and activities. Health care professionals I met used metaphors such as battery, fire and organism to talk about the body. Though metaphors of the body and illness have been analyzed as representations with a certain symbolic power in society (Martin, 1987; Martin, 1994; Sontag, 1978), I analyze these metaphors as part of health practices in which they contribute to the practical arranging of people, bodies, food and activities. I suggest they are more than projections *onto* metabolism; metaphors change what metabolic processes are and how they may transform. In a particular ordering, certain problems are attended to and specific normative ideals are pursued, while others are left out.

As the concern with an ‘active lifestyle’ is taken up in health care practices, moving is predominantly put forward as an important compensation for excess ingestion. In the first part of this article, I further investigate how this logic shapes practices and orders moving in a certain relation to eating that premises calculating as a strategy to ensure energy efficiency and weight loss. I contrast calculating with another practical logic, one aimed at activating people’s metabolic rate in order to enhance the body’s vitality. In the first, exercise is foregrounded for its ability to burn energy; in the second, it is mobilized for building vitality. These logics are not just two alternatives, but relate to each other. As will become clear, the second, foregrounding activating, responds critically to the first, which is more dominant. In the conclusion, I take these two logics to reflect on the relation between scientific knowledge and care practices.

Metabolic logic 1: Calculating input and output

Pieter is a cheerful, light-spirited 19-year-old student. After he quit his teenage fencing career because of an injury, he gained 40 kilos in six months, which he attributed to a lack of

exercise and his newly adopted 'student lifestyle'. When just paying attention to his own eating habits and adding a little exercise to his daily routine did not result in losing the weight he gained, he followed a rather rigorous diet. For two months, he ingested only 500 calories a day by means of special banana- and strawberry-flavored diet shakes. Compared to the recommended dietary intake for adult men (2500 kcal a day), Pieter's daily calorie intake was very little. He complemented his diet with working out, using the gym's 'cardio training' machine that had him move his arms and legs diagonally and forward and backwards. Combining these two techniques of bodily control, diet and exercise, Pieter quickly lost 27 kilos. He was excited to share his success with me:

“If you are on a cross trainer, well you see you have burned 500 calories at some point, so then I didn't eat anything that day, net. So I worked out, and then I effectively didn't eat! This probably sped up the process (of weight loss).”⁵

Striking in Pieter's weight loss project is the clear presence of the notion of zero-balance. When he effectively 'doesn't eat' by burning these calories in the gym, his body will start using up the excess stored energy and lose weight – or so his logic goes.

Pieter is joined in this reasoning by many others who use similar strategies of weight loss, but also by the Dutch national nutrition center, the *Voedingscentrum*, an important source of information for both citizens and health care professionals. I often encountered the 'wheel of five', the Dutch equivalent of the food pyramid published by the *Voedingscentrum*, in my fieldwork with health care professionals. On their website, what constitutes and leads to a 'healthy weight'⁶ is a central theme. Under the heading 'My weight' and then 'Energy balance', the reader is encouraged to look at their body as if it were a battery:

“The battery charges with food. It depletes by using that energy from your food.

Someone who moves a lot uses up a lot of energy. But when you eat more than you use up, your body will store the unused energy as fat. You will get fatter. When you eat less than you use, you lose weight”⁷

Moving is thus put forward as a possible *compensation* for ingestion. Pieter and the *Voedingscentrum* configure body weight as a matter of energy balance in which eating and moving can be captured by the same measure: energy. Foods can be measured according to the amount of calories they offer to a body, a measure of the kinetic energy of heat inside a foodstuff.⁸ The exercise metric equivalent of the calorie is the MET, the Metabolic Equivalent of Task. One MET is defined as 1 kcal/kg/hour and corresponds roughly to the energy cost of sitting quietly for one hour.

With these measures, activities and foods can be made equivalent to each other: Fries contain 20 times as many calories as boiled potatoes. Walking up the stairs for five minutes equals the energy spent watching television for an hour. Likewise, food can be converted to moving and the other way around: In 96 minutes of moderate walking, one burns the energy one took in with a portion of fries. In the equation of energy balance, then, food and exercise are quantified, and moving is the ‘other’ of eating: they can even each other out.

The arithmetic activities of exercise regimes and dieting depend on further sociocultural structuring. In many places, ‘western’ and otherwise, food already enters people’s food practices as ‘measured’ (Mudry, 2009): through conventional units of food and exercise; store packaging; and displays on machines, lists or apps (cf. Lave, 1988). Counting is further facilitated by the fact that packaged foods usually bear food labels indicating the amount of calories per portion or 100 gram. With regard to exercise, the Compendium of

Physical Activities, developed in the 1980s and updated every few years, indicates the energy expenditure of a large number of activities, as diverse as light bicycling, crab fishing and tap dancing (3,5; 4,5 and 4,8 METS, respectively) (Ainsworth *et al.*, 2011). Originally developed for standardizing self-report physical activity scales of people participating in epidemiological studies, it is now used for exercise and weight management programs across the globe. In gyms, the calorie counters on apparatuses that show the amount of calories burned after a workout, as well as those on apps and websites, are based upon this compendium (and are thus not a reflection of a person's actual energy expenditure). The *Voedingscentrum*, Weight Watchers and many other organizations and companies, offer apps and 'activity trackers' that allow one to keep 'diaries' of weight, exercise levels and how much and what has been eaten, thus making healthy living a matter of bookkeeping in which 'credits' and 'debits' have to be balanced together (Yates-Doerr, 2015b). Wearable technologies such as watches and apps track much more than input and output of energy. According to Natasha Schull, they open up a particular form of self-care that she calls "data for life" (2016). This particular project of weight loss, then, is part of, and draws upon, a vast network of knowledges, techniques and standardization that spreads out far beyond the Netherlands where the *Voedingscentrum* is operative.

The power of black-boxing

With its metaphor of the battery, the *Voedingscentrum* aims to make the logic of the energy balance intelligible for a large audience. In so doing, it evokes what has been described as a decidedly modern, mechanistic vision of the body that can be understood in input/output terms (Turner, 1982). When one moves, one 'uses up energy' that once came in through food, much like a car uses up fuel. Indeed, in my fieldwork, I witnessed professionals draw upon

the figure of the car to explain a similar logic of efficient energy use. As the body and its weight become in need of correction or intervention, I suggest the meaning of such metaphors lies in their *presentation* of certain ‘modes of action or ways of life’ (Kirmayer, 1992: 323). Drawing “on salient features of the vehicle to make latent features of the topic more salient” (Kirmayer, 1992: 332), they configure the body as having certain properties as well as foreground certain valuations of these bodies. It is in this regard interesting to compare these metaphors of the battery and the car. Whereas a dietician would use cars to bring into view the qualitative *variety* of bodies and food – saying, for instance, that a diesel car cannot drive on gas, and a jeep needs more fuel than a mini cooper – a battery presents no such particularities. Further, while a driving car brings out the productivity of the body’s labor and has an implicit notion of needs (diesel or gas), a depleting battery evokes the body as a passive resource for use, a mere storage of energy.

Unlike the battery or car, which cannot charge or fuel further when full, a body will grow to accommodate excess energy. ‘Unused’ energy is not excreted, but will sediment in the body. As portrayed here, then, it is not bodies that (should) balance, but people. Energy balance moves from being a mechanism that explains weight gain, to a technique. To be clear, many professionals would assert that strict calorie counting runs the risk of missing important nutrients. Adding the requirement that the food that is eaten contains enough nutrients, however, need not fundamentally alter the calculating scheme; it merely complicates it. The purpose of exercise is still the burning of calories. Moreover, the efficient use of energy and the aligning of input and output is foregrounded as a *project* of the person, rather than a capacity of the body. After all, if the body could balance ‘on its own’, there would be no risk of turning fat.

When the capacity of the body to ‘energy balance’ *is* foregrounded, it is as a complication: in my fieldwork at scientific conferences, several presentations on the health

benefits of certain dietary or exercise regimes discussed the problem that people compensate ‘on the other side’. For instance, when on a diet they will move less, or when exercising more they will eat a few bites more. This type of behavioral compensation may happen outside people’s awareness and thus often escapes self-report questionnaires, to the frustration of researchers.

Rather than describing the body *as* a battery, then, the reader is encouraged to treat his/her body *as if* it were such a mechanical object. This metaphor is thus not only indicative of the symbolic power of cultural and technological contexts, but also brings certain things and practices into view while foreclosing others. The equivalence of food and exercise has the advantage that counting is generally applicable to all food and exercise, and to all people and bodies. Much is ignored in the process. As bodily needs are reconfigured to quantitative measures, the quality and peculiarity of what one eats can no longer be part of the equation. Foods grown and processed in very different ways are made equivalent to each other in terms of their nutritional content. In addition, records of intake and expenditure are based on population averages and do not take into account the individual and temporal fluctuations of uptake, processing and storage caused by, for instance, cooking techniques and bodily processes. In targeting all people, then, this information is not for anyone in particular.

This elegant generality, however, is ideal for health promotion campaigns. Energy balancing can be done without knowing much about what calories or METs are and how metabolic processes work. Anthropologist Emily Yates-Doerr, borrowing a term from Bruno Latour (who in turn borrowed from cybernetics), points out that these mechanisms are often ‘black-boxed’ in nutrition education (Yates-Doerr, 2012a). Latour describes a black box as ‘a piece of machinery or a set of commands’ deemed ‘too complex’ to grapple with; as soon as it works, ‘in its place they draw a little box about which they need to know nothing but its input and output’ (Latour, 1987: 2-3). As long as the strategy of counting does what it needs

to do – as long as it has decisive *effects* – it is not deemed necessary, and may even be very inefficient, to attend to the precise mechanisms involved.⁹

People's weight loss strategies are often characterized by a similar pragmatism. Pieter's practice of balancing energy required him to know only two things: how many calories he ingested and how many he burned. Thanks to his diet products offering standard packaged portions, he did not have to calculate exactly how many calories the 'food' he ingested contained: this was always 500 kilocalories. On the display of this machine, he could see how many calories he had burned so far – or rather, what the average person of his height, age and weight (variables he inserts beforehand) will burn on that machine in that time.

As Pieter tells me, he had to start eating 'normally' at some point again. Since he stopped drinking his shakes two months ago, watching his 'energy balance' every day became more complicated. Now, practical considerations play into his everyday calculations:

“So I eat three sandwiches, maximum four sandwiches a day. And in the evening just a piece of meat with vegetables. And if you add that up then you will not go above the 1500 calories so I will at least have some space for when someone comes by with cookies or something, then at least you can have something, at least you have a buffer. And with sports, if I eat a lot, most of the time I will work out a lot the next day. To strive to burn as many calories as possible. (...) Strive to, I don't know, burn 1000 kilo calories in an hour (...) And if you take in only 1500 calories for dinner and bread on one day then you ingest actually only 500 calories, that is not such a big deal.”

In this logic, possible events causing fluctuations on one end of the equation, such as friends offering food, can be compensated on the other end – one snack ‘stands for’ an hour of exercise, exercise can leave space for a cookie in the evening. In other words, working out becomes ‘working off’.

In her study of how people enrolled in a Weight Watchers program count, Jean Lave notes that measurements and their meanings are variously transformed in practice. For instance, the more expert the dieter, the less calculating is necessary. She describes two possible approaches for counting calories in practice: people either meticulously control food portions or go with the idea that ‘as long as I feel hungry I must be losing weight’ (Lave, 1988). Pieter’s strategies show similar, but slightly different creative adaptations to the arithmetic logics implied in calorie counting. He stays well under the norm, for practical reasons. He will eat fewer calories during the day to ensure that he will not get into trouble later on. Further, he only takes into account how much he has burned in the gym, and not all the other ways in which he moves throughout the day. What matters to him is the movement that is counted (e.g. I burned *at least* 1000 kcal today). How much he moved exactly is not relevant as long as he stays within safe margins and keeps his ingestion under control.

Control

This metabolic logic stressing calculating comes with a mode of ordering that stages exercise as the ‘other’ of food, as the means to ‘spend’ the calories ingested. Calories communicate that ‘what must go in, must go out’.¹⁰ The body is portrayed as a vessel storing or using energy, and metabolism is black-boxed as the mechanism through which food is processed and neutralized. Exercise is here foregrounded for its ability to diminish and shrink the body’s fat and weight or to prevent the body from growing and storing energy in the first

place. For this project, both exercise and food *have* to be made knowable for you to know what you are allowed to eat, or whether you undid the ‘damage’ caused by eating. By staging input and output as in need of balancing, activity becomes something that can be isolated, calculated, monitored, and accounted. Movement is to be counted: what matters is *how much* you exercise.

An industrial model of metabolism, described by Landecker (2013), stages food as the raw material of labor. The knowledges and techniques it emerged from stressed a concern with how much one should eat in order to *work*. Exercise is wasteful, as energy could instead be spent on useful labor. In this metabolic logic, on the contrary, exercise is undertaken to (be allowed to) eat or to undo the damage done by eating. Rather than a concern with production and working bodies, there is a concern with consumption and its excesses. This metabolic logic fits a context in which most people are no longer engaged in manual labor but spend most of their days at a desk, in a ‘sedentary’ lifestyle, in which using up energy is no longer taken for granted. Overweight is evidence of indulging in food while failing to compensate with exercise, a situation to be corrected by proper bookkeeping.

In the ‘calculating’ mode of ordering, then, losing weight, both as a population (in obesity prevention policies) and as an individual (in commercial diets and health care practices), is the main concern. What Pieter and others like him value in this practice of counting is exactly this manageability of the problem. The ‘starve and sweat’ mantra that aims at minimizing food intake and maximizing expenditure has a specific temporal ordering too, playing out on the daily cycles of input and output. Built into it are promises of both immediate successes (burning 1000 kcal!) as well as considerable results in a short period of time (losing 40 kilogram in 4 months!). Of course, there are more modest versions of accounting strategies as well. The point is, however, that counting enacts these successes as within the control of the person, who can decide how much effort and

suffering one is willing to put into it. On the website of the *Voedingscentrum*, the reader is explicitly interpellated as responsible for his/her weight:

“Whether you are energy balanced (‘of je in energiebalans bent’), is mostly up to you. You, after all, decide how much you eat and how active you are.”

This mode of ordering thus responds to and incites a desire and sense of responsibility in people to have control over and correct their bodies. This resonates with Lee Monaghan’s observation, based on his fieldwork in a fitness center, that ‘constructing fatness as a correctable problem entails calculability, efficiency, predictability and technological control.’ (2007: 70): a body shaped according to principles of rationalization.

The pitfall of this project of weight loss, however, lies in this ability to remain in control. Practically, control is often not ‘really’ possible; practices are made knowable, but they also seem to only count when they can be counted. This is not just evident in how Pieter pragmatically uses his calculations, but also in how the metaphor of the battery itself is a technique rather than an explanation of one’s bodily workings. This elusive and requisite ability to remain in control resonates with a growing concern in the obesity field with the notorious ineffectiveness of weight loss and exercise regimes, especially in the long run (Douketis, Macie, Thabane, & Williamson, 2005; Gudzone et al., 2015). Typically, participants are able to ‘keep up’ with the schedule for a few months, lose some weight, then ‘succumb to temptation’ (food, the couch), gaining what they lost and more. Usually, then, another cycle, played out over a longer period of time, can be observed, in which periods of control are alternated with periods of release. It is precisely this ability to stay in control – to keep one’s hands on the wheel – that a calculating strategy hinges on.

Metabolic logic 2: Activating metabolism

Some of the caring practices that I encountered in my fieldwork that were explicitly concerned with exercise similarly put forward the ingestion and expenditure of calories. Like the *Voedingscentrum*, these practices proceed from the knowledge that if one moves more, one uses up more energy. But rather than directly linking to weight management through energy control, this knowledge is mobilized as part of quite a different logic that I saw emerging in my fieldwork with trainers and dieticians. As an introduction to this second mode of ordering, consider the approach of Sarah de Hoop, who has a private practice as a weight consultant in a small town in the northern Netherlands.

“In classes I give at a local gym, I try to get women to do strength exercises. They are always afraid they’ll turn into body builders, but then I explain that won’t happen that quickly, but that it is very good because muscles will use up much more, even while you are sleeping. This thought usually appeals to them [laughs]. Losing weight while sleeping? A lot of people do cardio training, because that will make them lose weight. Sure, true, but it works only for a short time, while if you build muscles you will profit from this for 24 hours.”

Fabian and Christel, a couple running a franchise of an international circuit training program for women, work on building muscles too: workout sessions in their gym consist of 30 minutes, in which 1-minute strength exercises on hydraulic pressure machines are alternated with exercises on aerobic steps. They stress that they aim to improve health and achieve weight loss for their members by activating the body’s metabolism. As they welcome me in their fitness club, Fabian talks a lot while Christel occasionally interjects. They tell me that

when the goal is to activate the body's capacities to transform food into energy, eating and moving are not each other's opposites, but have to work together:

Fabian: "So exercise is key to losing weight and keeping up the burning, but good eating is key to having energy and building muscles; it is an inextricable combination. You can show people that when they eat well, their energy will increase substantially. And then sport starts paying off too."

Here, metabolism, understood as the process that ensures the release of energy in the body, is the object of intervention and care itself. It is presented as a fire that can intensify or diminish. Not only is food presented as building blocks, fuel that can feed this fire in order to increase energy, but exercise is also enacted as a way to keep energy expenditure going, much like oxygen does for fire. In order for sports to 'pay off', then, people who increase their exercise should eat more. Both need each other.

Recently, Fabian and Christel started collaborating with a dietician to incorporate advice on food and eating into their program, because they noticed this was often 'an issue'. In order to give an indication of bodily needs, the fitness center uses the 'basal metabolic rate' (BMR) to measure the energetic needs required to keep the vital functions of the body going when it is in rest. In order to accurately measure an individual's BMR, one would need a laboratory – however, formulas are available that approximate this BMR, varied by age, gender, height and weight.¹¹ For the average person, the BMR amounts to around 1500 calories a day. Fabian stresses that regularly active people may even need around 2800 calories a day. Christel shows me menus that make up 2000, 2300 or 2800 calories, which are meant to give their members an idea of how much food that is. The selection of food, moreover, takes into account nutritional content and the proportions of carbs, fats and

proteins in one's meals. Such menus are a common tool for dieticians, through which they translate the meaning of calories and nutrients to conventional meals and food items. One such menu, adding up to 2615 calories, includes:

Breakfast: 2 slices of whole-wheat bread with diet margarine, egg salad, a slice of aged cheese and 1 glass of semi-skimmed milk.

Snack: 1 currant bun with diet margarine and 2 mandarins.

Lunch: 3 slices of whole-wheat bread with diet margarine, with diet spread cheese, a fried egg and a slice of lean meat.

Snack: 1 fruit, a glass of semi-skimmed milk, one cup-a-soup, 2 slices knackebrod, diet margarine and 50 grams of smoked salmon.

Dinner: 125 lean meat or fish, 15 ml of oil/butter, 200 grams of potatoes or 100 g pasta/rice and 200 grams of vegetables.

Snack: 1 piece of fruit, 1 bowl of vanilla custard, 2 crackers, diet margarine, aged full fat cheese and raw ham.

These lists stage food such as bread, potatoes, milk, and vegetables as the norm, as opposed to, for instance, fast food or cookies and crisps, which according to Fabian are not very helpful. These lists are not to be followed rigorously, and members are not encouraged to do calorie counting, but they are distributed to help people 'get it': when moving, one needs to eat *well*. Food, in this logic, is potentially a facilitator and activator. So not only are eating and exercise no longer each other's opposites, they also change character: in this mode of ordering, what kind of moving you do (muscle building instead of cardiovascular training) and what kind of food you eat, matters.

Conditions for thriving

Often, this message that one should eat more is met with joy and amazement: ‘Am I allowed to eat all that?’ In their practice, however, Fabian and Christel also encounter one major obstacle for this activating project: out of a desire to slim down fast and a fear of gaining weight, their members often do not eat nearly enough to be exercising. According to Fabian and Christel, this behavior risks jeopardizing the health of their body and is counterproductive in the long run.

Fabian: “I try to confront my members: so how long do you think 1200 calories is healthy for your body? Isn’t that just bad for your organs? That is just crashing. [...] If you give the body too little, the body will slim, because... it is just a natural organism responding, and it thinks like: I am ingesting too little, I need to respond. But it will slim down where it should not; it turns down the fire. [...] So you lose muscle tissue and keep the fat protecting the body, because that is its reserve. [...] The effect food has when people consistently deprive their body of it... if you give it enough for once, all kinds of things start happening.”

Christel: “Hair growth, glowing skin... Their digestion and bowel movements normalize, really: unbelievable! You think, man! And all this reveals itself when you start caring for it.”

Christel points out that if moving and exercise are seen in combination, they may do great things to the body. If one stokes the fire in the right way, one might even start glowing. Further, Fabian makes a distinction between *kinds* of weight loss: one made possible by bad, unhealthy ‘crash-dieting’, the other by ‘caring’, healthy practices. The first kind causes

people to quickly gain weight as soon as they start eating again – leading to the notorious ‘yo-yo effect’ – but also makes all kinds of processes in the body function less well; their skin turns pale, their mood goes down, energy is low and digestion falters. Metabolism will slow down and go into ‘saving mode’: muscles, a readily accessible energy storage, will be eaten, while fat, the body’s ‘reserve’ and insulation, is retained. Once the body has received enough food again – and the dietary intervention aims to ensure this – it will be able to take on its full range of functions, and thrive. As the bodily processes between the ‘input’ and ‘output’ of energy are thus foregrounded, evaluations shift: when stressing that the body does something *valuable* with food, low-calorie food is not ‘good’ because it does little ‘damage’, but ‘useless’ because it gives the body nothing.

In order to bring out all these processes, Fabian calls the body an organism, an entity outside of ‘we’ or ‘you’ that eats and does certain things in response to our actions. This organism interprets little food as a crisis. It will slow down and go into ‘survival response’, protecting itself against scarcity. Food, then, is here not only enacted as a source of energy and a building block for the body, but also as providing cues from the external environment, mediating how the body regulates its internal functions. Though this is a helpful evolutionary response in *actual* times of hardship, here it is understood as a false alarm. It is an ‘unnatural’, forced scarcity that the person will not be able to uphold, which will eventually lead her to start eating. Weight gain is portrayed as a consequence of this process: once the person starts eating again, the body will not burn everything that comes in; whereas without this period of forced fasting the metabolic rate would be higher and this energy would be burned and put to good use. In this mode of ordering there is thus still a possibility of eating in excess, of unused energy with weight gain as a result. But how much food is *enough* or *too much* is not general and static, but is instead dependent on what the body has gotten used to in the past. This means that someone who has been dieting cannot immediately adapt to 2600

calories, and would need to, with supervision, carefully build up eating in combination with exercise. The body may then slowly ‘learn’ that food is available and can be invested elsewhere. It is thus endowed with both a memory and a forward-looking capacity, and this is something a person can play into in order to get in sync with the body.

Importantly, through this focus on regulatory crises, other possible causes of disturbance come into view. For instance, sleeping was a concern in many of the dietary practices I observed. Clients were told that respecting circadian rhythms was important to keep metabolism going, and that if they did not sleep enough their body would start looking for energy elsewhere, e.g. in food. Likewise, the troubles and frustrations of everyday life, often summarized under the term ‘stress’, were considered detrimental to proper functioning of the organism.

Fabian: “We measure every month, and when there is no improvement, people get very frustrated. Some try real hard for a short time, but then quit... yes, stress has an impact. They are all so busy, busy, busy. And stress sets off processes in the body that have a negative impact on weight loss. It stimulates hormones that make the body go into ‘saving mode’. And sports are of course a good countermeasure for that; endorphin is produced which makes people feel good, it suppresses things, but still stress is an important factor.”

As stress puts the body into ‘saving mode’, thereby actively countering the ‘good’ kind of weight loss, relief of stress is necessary. Like the battery, this notion of ‘saving mode’ presents the body as an apparatus, but interestingly, here it is a ‘smart’ technology that ‘knows’ how to maximize the available energy, invest in certain parts and tissues and adapt to perceived changes in the environment. Like a computer, it may ‘crash’. This notion of the

organism is thus itself inspired by information technology and the feedback loops and signaling pathways of computer models (Sanabria, 2015).

Along the way, another advantage of exercise is foregrounded: it counters frustration. This does not only play out on a physiological level; an important part of the appeal in this approach is its immediate sensorial effects:

Fabian: “There are measurable results, but we don’t like to focus on those. Because we are in very close personal contact with our members, we can discover the... mental advantages too. We notice people saying; I feel so good, I am so happy this gym is here for me in my neighborhood.”

In the mode of ordering premising calculating, whether one feels good or not because of exercise is made irrelevant for projects of weight loss. But here, ‘feeling good’ figures as a stress-countering, vitalizing effect that encourages a fully functional, active metabolic system. It is added to the range of things that matter.

Dispersed coordination

In this second metabolic logic, then, the concern is with ‘healthy’ weight loss, where health is understood as the thriving of an organism and its functions. Whereas in the first, metabolic processes deplete the battery, in the second, metabolism is a fire that, burning fast or slow, conditions the body’s vitality and abilities. The speed with which the body can put food to good use is thus configured as a moving target that is open to modulation by both (certain kinds of) food and (certain kinds of) exercise. The use of the Basal Metabolic Rate informs the importance of this activation mantra, while the image of the organism foregrounds the

valuable functions of food and muscles and the active responsiveness of the body. The temporal scope of this mode of ordering is longer term; beyond a single workout, one's metabolic fire can stay high for an extensive period of time – as long as it is consistently fed. Weight loss takes longer too, but is presented here as more durable.

Like that of the battery, the metaphors of fire, organism and saving mode help reconfigure how people are encouraged to affect and tinker with their body and metabolism through eating and exercise. It presents a range of possible effects they might value in relation to it: importantly, vitality, but also relaxation and a general 'feeling good'. Rather than mere added benefits to projects of healthy living, these feelings are central to it. In other words, the relation between these effects is not hierarchical, but one of equivalence. The balance strived for relates to the extent to which all kinds of energetic activities – exercise, eating, sleeping, and the demands of daily life – are in sync with each other. What emerges is the need for dispersed coordination and the flow of proper communication: between resources, different bodily functions and the person and his/her body. The person and his/her body affect each other such that one does not have complete control over the other. The person may only stoke the fire, nudge it in various directions, while conversely, the workings of the body may make him/her feel better or worse.

As my informants tell me, however, it is difficult for people to accept that though such an active metabolism may prevent weight gain and even lead to weight loss, such change does not happen overnight. This practice of activation depends on the person's motivation and inclination to trust the processes in the organism without being given measured feedback to keep it 'in check'. The fire needs to be stoked in the trust that one day, it will work wonders. Fabian and Christel provide motivation and encouragement along the way, but this long process is not what their members, who generally go to the gym to lose weight *fast*, want and are willing to accept. Though one may experience immediate effects of

hair growth and enjoy the feeling of vitalization that food and exercise may bring, the desirable number on the weighing scale may come too slowly, and the ideal dress size may never come. Failure to meet their expectations thus leads people to frustration and disappointment. Where counting input and output is solely in the hands of the person, relating to a body-as-organism hinges on responsivity and trust in other active entities.

Discussion: innovation in care

How do eating and moving relate? This question is generally left to scientists, where the problem of excess body weight is a puzzle that, however complex, has a solution. In mundane practices of weight management, however, where the primary aim is not to understand metabolic processes but to intervene upon them, the relation between eating and moving is mediated and enacted through the various knowledges that circulate in these practices. In this article I showed this is done in situated ways by contrasting two different ‘metabolic logics’, that stage some elements as movable and some as fixed. In the first, the body is enacted as a vessel storing energy, while through metric conversions food and exercise can be made equivalent to each other. In the second, by contrast, the body is enacted as an active entity responding to its environment. Its metabolic rate is staged as open to modulation by both eating and exercise, as well as other energetic activities. I stress metabolic logics do not just present ideas on bodily functioning. They are also and importantly a practical and material affair. The coherences emerge in techniques of quantification and in the use of metaphors, as well as in professional ways of working and everyday routines.

The analysis complicates the idea of a ‘science-based’ approach to healthy eating, which holds that ideally, research findings are handed down to governmental policy, nutritional agencies, health care practices and the public, where they may be applied. Clearly,

prescriptions for health emerging from laboratory research do not land in a social vacuum. Rather than premising scientific or technological innovations, I have analyzed what emerges in mundane practices where knowledge and techniques are incorporated in – or hit up against – other modes of ordering practices. In ‘the wild’, people grapple with often contradictory messages embedded in cooking traditions, printed on labels and spread through popular media. Advice is furthermore directed at people who have already been sensitized to particular bodily ideals and have acquired certain capacities for self-care rather than others, while cooking, tasting and eating together.¹² In weight management practices, these complexities are dealt with by variously adapting scientific knowledge to the pragmatics of daily life.

The modes of ordering I articulated are thus also different modes of doing *good*, where facts and knowledges inform and are weighed with certain ideal bodily states and effects. In the logic premised on calculating, health concerns are centered on the weight of the body. Bookkeeping of ‘input’ and ‘output’ is staged as the means towards the desired goal of weight loss. This metabolic logic is most available to people as it is part of socio-material orderings of food portions and exercise apparatuses and fits with the presentations of commercial diets, advertisements and other aspects that fuel beauty ideals. The isolated ‘goods’ of metrics and conversions are easily communicated through general nutritional advice or sold by commercial weight loss programs.

In the logic that premises activating, thriving is the ultimate goal. When overweight is a concern growing muscles, giving one’s body the food it needs and avoiding stressors are ways of creating the conditions for such thriving. Fabian and Anita are able to facilitate the long-term commitment and personalized, constant adjustment this requires – indeed, it is part of their business model. Weight loss is valued in this logic, but only if it does not happen at the expense of the body’s wellbeing. This metabolic logic is emerging: the pleasures and

desires for the right conditions for the organism to do its job in the best way possible perhaps fit with a growing food culture in which ‘good’, natural food is popular, and in which ‘health’ in less measurable forms is celebrated. In weight management, the shift in focus signals an important change.

In my fieldwork on professional care practices, I observed that although weight loss was the ideal that led people to seek out professional care practices, what were meaningful changes in care practices often had little to do with numbers on the scale. Starting an exercise routine, gaining self-confidence or feeling good and energized were positively valued changes in themselves. This emphasis on ideals other than direct weight loss may be read against the (notorious) difficulty of actually achieving weight loss over longer periods of time. Many of the professional care practices I studied aimed to strengthen client or patient motivation to change by creating possibilities for success. In contrast, striving for weight loss could set one up to fail.

In short, whereas in the first logic the postindustrial concern with ‘*how bodies transform through matter*’ (Landecker, 2013) translates to a preoccupation with consumption and its excesses, the second logic foregrounds modern life and its disturbances. Importantly, it stages controlling weight loss attempts as one such possible disturbance. The modes of doing ‘good’ that come with these metabolic logics, then, do not merely exist next to each other; they are in tension. In my material, the tension between the two emerged most prominently in the differences between the approaches used by professionals, and the ideas, wishes and techniques their members or clients engaged in. The second mode of ordering presents the use of the energy balance equation for controlling weight as a harmful and counterproductive strategy for weight loss. The body – staged as a self-regulating organism – will face long-term disturbances and neglect from daily input/output equations. Whereas in the first mode of ordering the (in)ability to stay in control is at stake, in the second, the logic

of activating is haunted by rigidity and system shut-down. Pieter's strategies, then, as told through the logic of activating, are no good at all: his efforts and motivation become a harmful excess of will. They are a disturbing mediator between the body and the environment, failing to adequately fit his body's needs and mechanisms.

The logic aimed at activating metabolism incorporates a concern with overweight and does not escape normalization of body size and weight. It does present, however, a critical response to the calculating strategies of healthy eating that were predominantly put forward for remedying industrialism's pathologies. This response is shaped by knowledges stemming from scientific practices that emphasize feedback loops and distributed action. New metabolic practices, however, do not merely follow from novel scientific insights into how fat comes about; they include estimations of what knowledges are *helpful* in dealing with fat in daily life.¹³

Health care professionals innovate, too, as they come to terms with the complexities involved in health projects. These innovations in mundane care practices shape how the problem of obesity is understood, targeted and judged. They have normative effects beyond themselves, influencing the lives of people considered obese beyond those who engage in weight management. At the same time, attention to the minute details of my informants' efforts reveal how difficult such innovation may be in practice. As Fabian and Christel are confronted with their members' fears of eating more and gaining weight, they are not only confronted with *ideas* about what is or is not healthy, but also with calorie lists, food packaging, weighing scales and commercial diets that convey these norms. In exercise machines, recommended dietary intakes or diet shakes, figures of food as fuel and bodies as machines stubbornly sediment.

In conclusion, I suggest that rather than take these processes as emerging 'in' the body, those of us who are interested in 'thinking metabolically', can address metabolism as

part of socio-material practices that narrate eating, bodies and moving together in particular ways. By articulating and contrasting metabolic logics, it has been my aim to highlight alternative and emerging repertoires of engaging, both theoretically and practically, with the morally charged but notoriously persistent problem of overweight.

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Notes

¹ By present standards, half of the adult population is overweight (CBS, 2016).

² This study was part of ethnographic research in the Netherlands between 2011 and 2014 on sites and situations in which the concern with obesity is somehow present, ranging from dietary advice, fitness programs, mindfulness courses, obesity surgery and lifestyle coaching.

³ Thus not taking into consideration other concerns that come up in exercising, including personal achievements, competition, sociality etcetera, though all these may go together with a concern with body weight.

⁴ There are considerable interests at work in the emphasis on exercise rather than diet. For instance, Coca-Cola recently funded the ‘Global Energy Balance Network’ that mobilizes exercise scientists and downplays the need to cut down on calories in favor of exercise. For a discussion on how industry-research partnerships structure the field of evidence in such a way that the problem of obesity continues to be framed as one of individual responsibility, see Sanabria (2016).

⁵ Informants were anonymized and field notes and interview transcripts were translated into English from Dutch.

⁶ Defined as a Body Mass Index of 18,5-25 kg/m³.

⁷ (Last Accessed February 26, 2016, <http://www.voedingscentrum.nl/nl/mijn-gewicht/gezond-gewicht/energiebalans.aspx>)

⁸ One kilocalorie stands for 4.18400 kilojoules of energy. 1 calorie equals the amount of energy needed to heat one gram of water with one degree Celsius.

⁹ Here, metabolic processes are not just too complex to understand; measuring individual food expenditure and intake is also practically impossible in daily life. Currently, such precise measurements can only be done by confining a subject to a ‘calorimeter’ where his/her food intake is controlled and carbon and oxygen emissions are measured.

¹⁰ John Coveney (2002) even asserts the accounting practices calories are part of carry a protestant appreciation of prudence and ascetic aversion to ‘bodily sins’.

¹¹ For instance with the Mifflin St. Jeor Equation: For men: $BMR = 10 \times \text{weight (kg)} + 6.25 \times \text{height (cm)} - 5 \times \text{age (years)} + 5$; For women: $BMR = 10 \times \text{weight (kg)} + 6.25 \times \text{height (cm)} - 5 \times \text{age (years)} - 161$.

¹² These points are beautifully illustrated by the work of both Bodil Just Christensen, who traces the meaning of nutrients and healthy eating advice in the lives of conscripts and bariatric surgery patients in Denmark (2014), and Rebeca Ibáñez Martín (2014), who describes the relations and misfits between nutritional recommendations and cooking practices in Spain.

¹³ When exploring how science interferes in daily life, questions of ontology and normativity thus go together. The political questions that thus emerge revolve around, in Annemarie Mol's words: 'how to value contrasting versions of reality' (2013: 3)

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