



Intermittent Fasting Regimens: Efficacy, Adherence and the Patients for Whom They Are Inadvisable

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Abstract

Intermittent fasting regimens are widely adopted and the randomised evidence for them is narrower than that adoption implies. In a 12-week trial of 116 adults, a 16:8 pattern produced a weight change of 0.94 kg lower than baseline against 0.68 kg with three structured meals, a between-group difference of 0.26 kg with an interval from 1.30 kg lower to 0.78 kg higher. In a 12-month trial of 139 adults, a restricted eating window added to calorie restriction was no better than calorie restriction alone on weight or on any body composition measure. Restriction of intake, not the timing of it, is what the trials support. Two further findings qualify the picture. In the imaged subgroup of the shorter trial, 1.10 kg of the 1.70 kg lost was lean tissue, around 65 per cent, which the investigators noted far exceeds the usual 20 to 30 per cent, with a significant between-group difference in appendicular lean mass index. And several groups were excluded from these trials or are advised against the regimens, which is where the practical caution belongs.

Keywords: Intermittent fasting; Time-restricted eating; Energy restriction; Lean mass; Contraindications

Introduction

Intermittent fasting describes a family of patterns rather than a single intervention, and the members differ enough that evidence for one does not transfer to another [1,2]. Daily time-restricted eating confines intake to a window; alternate-day and 5:2 patterns vary intake between days; extended fasting is different again [1,2,3].

Public interest has run ahead of the trial base, and the regimens are frequently presented as acting through mechanisms independent of energy intake [3,4]. Whether the randomised evidence supports that separation is the question this review examines, alongside two others that receive less attention: what the regimens cost in adherence, and who should not be using them [4,5].

This is a review of published trials. It does not offer a fasting schedule, an intake target or a plan for any individual reader.

Objective

This review sets out to establish four things from the published literature. First, what the controlled trials found when a restricted window was compared against eating across the day. Second, what happened when it was added to energy restriction. Third, what the body composition data show. And fourth, which groups the trials excluded or the literature advises against.

Literature Review

Against eating across the day: A 12-week randomised trial enrolled 116 adults with a body mass index between 27 and 43, mean age 46.5 years and 60.3 per cent men, and compared a 16:8 pattern, with intake confined to the hours between noon and eight in the evening, against three structured meals per day [6]. Weight fell by 0.94 kg in the restricted arm (95% CI 1.68 to 0.20 lower, $P = .01$) and by 0.68 kg with structured meals (1.41 lower to 0.05 higher, $P = .07$). The difference between groups was 0.26 kg (1.30 lower to 0.78 higher, $P = .63$) [6].

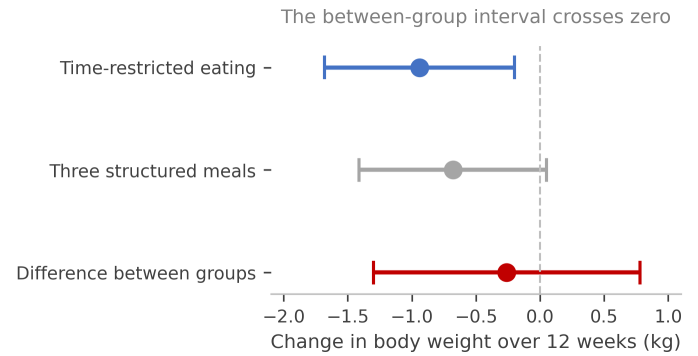


Figure 1: Weight change over 12 weeks, by arm and between arms [6]

Added to energy restriction: A 12-month randomised trial of 139 adults with obesity compared a restricted eating window combined with calorie restriction against calorie restriction alone [7]. Both regimens reduced weight, and both reduced lean mass, visceral fat, subcutaneous fat and liver fat, with no significant differences between the groups. Trunk fat and appendicular lean mass were similar at 12 months, and measures of glucose handling and lipids did not differ [7]. The longer trial therefore reaches the same conclusion as the shorter one from the opposite direction [6,7].

Table 1: What each randomised comparison established [6,7]

Comparison	Duration	Result
16:8 vs three structured meals	12 weeks	-0.26 kg, ns [6]
Window + restriction vs restriction	12 months	No difference [7]
Either, against no intervention	Both	Weight falls [6,7]

What that leaves as the mechanism: Neither trial found an effect of timing separable from intake, and the shorter trial found no significant difference in estimated energy intake between its arms either [6,7]. The parsimonious reading is that these patterns work when they reduce intake, and that the window is a means of achieving restriction rather than an independent mechanism (Figure 6) [4,6,7]. This is not a criticism of the approach. A method that helps someone eat less is useful whether or not it acts through a novel pathway, and framing matters for what is promised rather than for whether it is offered [4,8].

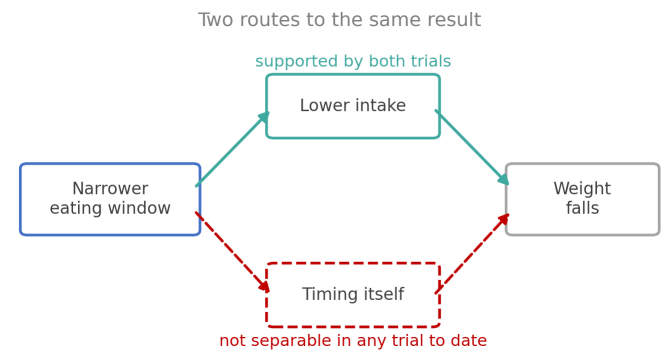


Figure 6: Two candidate routes from a narrower window to weight change [4,6,7]

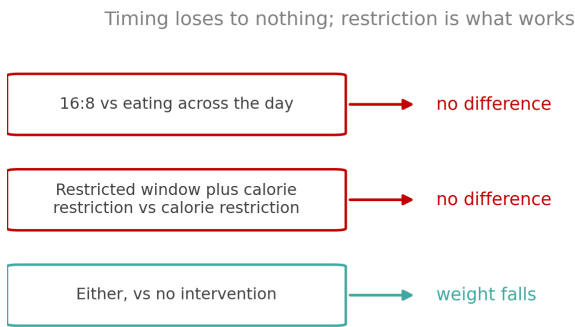


Figure 3: The comparisons made and the answers obtained [6,7]

The honest complication: In the subgroup of the 12-week trial that attended for imaging, 25 participants per arm, the restricted arm lost 1.70 kg, of which 1.10 kg was lean tissue and 0.51 kg fat [6]. That is roughly 65 per cent of the loss as lean mass, and the investigators noted it far exceeds the usual range of 20 to 30 per cent [6]. The between-group difference in appendicular lean mass index was 0.16 kg/m² (95% CI 0.27 to 0.05 lower, $P = .005$), with appendicular lean mass differing at $P = .009$ [6].

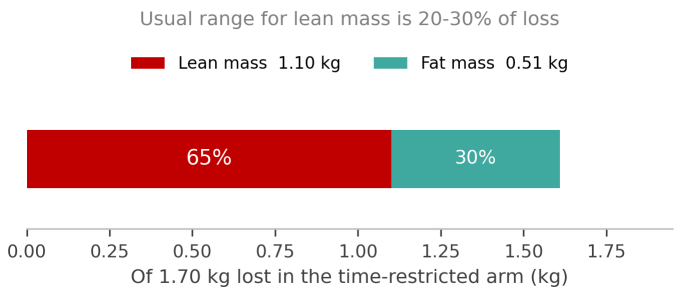


Figure 2: Composition of the weight lost in the imaged subgroup [6]

How much weight that finding should carry: It came from 50 people, it was a secondary outcome, and the trial did not collect dietary intake data that would show whether protein intake changed, which the investigators identified as a plausible explanation warranting study [6]. The 12-month trial found no between-group difference in lean mass or appendicular lean mass, so the two trials disagree on this point (Figure 4) [6,7]. A finding that is significant in one trial of 50 and absent in another of 139 is unresolved rather than established [6,7,9].

Table 2: Cautions as stated in the reviewed literature

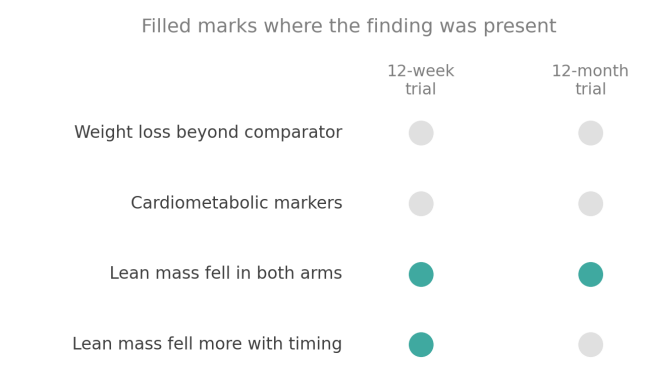


Figure 4: Where the two trials agree and where they do not [6,7]

Adherence and dropout: Trials of these regimens report withdrawal for reasons of tolerability and difficulty sustaining the pattern, and comparisons with continuous restriction have not shown a consistent adherence advantage for either approach [5,10,11]. The proposition that a restricted window is easier to sustain than counting intake is plausible and is the practical argument most often made for it, but it is supported by preference and retention data of varying quality rather than by a designed comparison [5,10,12]. Adherence is also the mechanism by which any of these patterns produces its effect, so it is not a secondary consideration [8,10].

Who should not use these regimens: The trials excluded, and the literature advises against, several groups (Figure 5) [1,13,14]. A history of an eating disorder is the clearest, because prescribed restriction of eating windows overlaps directly with disordered eating behaviour and can precipitate relapse [13,15,16]. Pregnancy and lactation, treatment with insulin or sulfonylureas because of hypoglycaemia risk, underweight or frailty in older adults, and children and adolescents are the others commonly listed [1,13,14,17].



Figure 5: Groups excluded from trials or advised against these regimens [1,13,14]

Group	Reason given in the literature
History of eating disorder	Overlap with disordered eating [13,15]
Pregnancy and lactation	Excluded from trials [1,13]
Insulin or sulfonylurea	Hypoglycaemia risk [14,17]
Underweight or frail	Lean tissue and reserve [6,13]
Children and adolescents	Growth; no trial evidence [13,14]

The eating disorder question deserves separate weight: Screening for disordered eating before recommending any restrictive pattern is advised in reviews of this literature, and the concern is not confined to those with a formal diagnosis [13,15,16]. Rigid rules about permitted eating times can function as a socially acceptable frame for restriction, and the studies that report psychological outcomes alongside weight are a small minority of the field [15,16,18]. The absence of harm signals in trials that excluded susceptible participants is not evidence of safety in those participants [13,15,16].

Diabetes requires medication review rather than caution alone: Where treatment carries hypoglycaemia risk, changing the distribution of intake changes the timing of that risk, and guidance addresses this as a matter for medication adjustment rather than a simple contraindication [14,17,19]. Trials in type 2 diabetes exist and report glycaemic outcomes comparable to continuous restriction, again without a timing effect separable from intake [17,19,20]. The practical point is that these regimens interact with prescribing, which distinguishes them from most dietary patterns [14,17].

What the wider synthesis shows: Systematic reviews and meta-analyses comparing intermittent with continuous energy restriction report broadly equivalent weight change and cardiometabolic outcomes, with heterogeneity attributable to regimen, duration and population [4,10,11,21]. Reviews focused on metabolic markers reach similar conclusions and note the short duration of most included trials [11,21,22]. Where an advantage is reported it is usually small, within the range attributable to differences in achieved intake, and not replicated across syntheses [4,11,21].

Trial durations are short: Most randomised evidence runs to 12 weeks or fewer, and the 12-month trial is among the longest available [6,7,22]. Weight regain after any dietary intervention typically occurs over a longer horizon than these trials cover, so the question of whether a restricted window is more sustainable in the years after a trial ends is untouched by the data [8,22,23]. That is the question a patient considering the approach is usually asking [8,23].

Table 3: Five claims and what the randomised evidence says

Claim commonly made	Status in the trials
Superior to eating across the day	Not shown [6]
Adds to energy restriction	Not shown [7]
Acts independently of intake	Not separable [4,6,7]
Easier to sustain	Not demonstrated by design [5,10]
Safe for everyone	Several groups excluded [13,14]

Does the placement of the window matter? Trials of an earlier window report improvements in insulin sensitivity and blood pressure, in one case without weight loss, and a 10-hour window in metabolic syndrome reported reductions in weight and

atherogenic lipids in an uncontrolled design [24,25]. A randomised trial of early time-restricted eating in adults with obesity found greater weight loss than a control window, though the arms differed in more than timing alone [28]. Mechanistic work reports reduced appetite and increased fat oxidation without a change in energy expenditure, which is consistent with an intake route rather than an expenditure one [32]. Early placement is therefore the version with the most supportive mechanistic data and the least practical uptake [25,28,32].

Alternate-day and 5:2 patterns: A 12-month randomised trial of alternate-day fasting against daily calorie restriction and a no-intervention control found no superiority for the fasting arm on weight or cardiovascular measures, and dropout was higher in it [26]. An earlier trial in overweight women comparing intermittent with continuous restriction found comparable weight loss and metabolic marker change [27]. Reviews comparing these patterns with continuous restriction reach the same conclusion [33]. The pattern across regimen types is consistent: where intake is matched, outcomes match [26,27,33].

Attempts to isolate fasting from restriction: One trial was designed specifically to separate the two by comparing fasting with and without energy restriction against restriction alone in lean adults, and found that the fasting component did not confer additional benefit for weight loss or metabolic health [31]. **Feasibility and pilot studies of restricted windows** report weight change of the magnitude expected from the intake reduction they measured [29,30]. Taken with the two main trials, the attempts to demonstrate a timing effect independent of intake have not succeeded [6,7,31].

What the syntheses conclude: Meta-analyses of intermittent energy restriction against continuous restriction report small or absent differences in anthropometric outcomes and intermediate disease markers, with the certainty of evidence limited by trial size and duration [21,34]. Where a synthesis separates regimen types, no type emerges as reliably superior [21,33,34]. This is a field in which the number of published trials is large and the number of questions they have settled is small [22,34].

Method

This is a narrative review of published literature. Sources were assembled by searching the indexed literature for randomised controlled trials, systematic reviews and clinical guidance concerning intermittent fasting and time-restricted eating in adults, with precedence given to trials with an active comparator and to those reporting body composition or duration beyond 12 weeks [6,7].

Effect estimates are reproduced as their authors published them, with the interval attached. Where two trials disagree, both results are given rather than the more convenient one [6,7].

No new patient data were collected and no search protocol was registered, so this is not a systematic review. Eating

windows and intake figures are described as the designs of the studies that used them and are not offered as guidance for any individual.

Concluding Remarks

The randomised evidence supports a modest conclusion. Confining intake to a window produces weight change comparable to eating across the day, and adds nothing measurable to energy restriction over 12 months. What these regimens do is help some people eat less, which is a legitimate function and a different claim from the one usually made for them.

The body composition finding is unresolved. One trial of 50 imaged participants found an unusually high lean fraction of a small total loss; a larger and longer trial found no between-group difference. Neither result should be quoted alone, and the shorter trial could not examine the explanation its own authors proposed.

The part of this literature that carries the clearest practical weight is the list of people for whom these patterns are not appropriate, and in particular anyone with a history of disordered eating. That caution rests on the nature of the intervention rather than on trial data, because the trials excluded the people it concerns.

Study Limitations

Most trials are short, and the regimens studied differ enough that pooling them obscures as much as it reveals. Dietary intake data are frequently self-reported or absent, which is what prevents the timing question from being separated from the intake question. Body composition substudies are small.

Trial populations were predominantly middle-aged adults with overweight or obesity and without the conditions listed as cautions, so the safety record of these trials does not extend to the groups they excluded. Absence of reported harm in that setting is not evidence of safety in the groups the literature advises against.

Why the field keeps producing trials: The regimens are cheap to study, popular with participants and require no product, so the barrier to running another small trial is low, while the trial that would settle the timing question requires tightly controlled intake and a duration few funders support [22,31,34]. The result is a large literature of short studies with heterogeneous protocols, which is the structural reason syntheses report heterogeneity rather than a defect of any one study [21,22,34].

What to say when asked: A patient asking whether to try one of these patterns is asking a reasonable question with a defensible answer. If the pattern helps them eat less and they are not in one of the groups the literature advises against, the trials give no reason to discourage it and no reason to expect more from it than

from any other route to the same reduction in intake [4,6,7,13]. Claims that the timing itself confers metabolic benefit beyond that go past what has been shown [4,31].

Where research would be most useful: Longer trials with measured rather than self-reported intake would address the mechanism question; trials that recruit rather than exclude older adults would address the lean mass question in the population where it matters; and studies reporting eating-behaviour outcomes alongside weight would address the caution that currently rests on reasoning rather than data [6,13,18,22]. None of these requires a novel method, only a design that answers the question being asked of the field [18,22,34].

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Conflict of Interest

The authors declare no competing interests.

Ethics Statement

This article reviews previously published studies only. No new patient data were collected and no participants were recruited, so ethical approval was not required.

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