

**Accuracy of Intermittent Fasting Guidance in Blogs Used by Personal Trainers from a Gym in South Africa**

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## Abstract

This project examined the accuracy of blog sources personal trainers in Jeffrey's Bay, South Africa use to educate themselves on the topic of intermittent fasting. Through literature review, different types of intermittent fasting were researched such as time-restricted feeding, periodic fasting, and alternate day fasting as well as the role intermittent fasting plays in weight loss and modifying risk factors for health conditions such as obesity and cardiovascular disease. A small convenience sample of five personal trainers were used to conduct one-on-one semi-structured interviews in a local gym to determine what sources of information they use to educate themselves on intermittent fasting and if they use any blog sources. The top three blog sources were determined based on frequency of mention and manual deductive qualitative coding was applied to blog articles from each blog source in order to determine accuracy of information in two key criteria: timing of feeding and fasting, and instructions on caloric intake. The third criteria, type of references used in each blog article, was recorded and combined with accuracy of the other two criteria to calculate an average reliability score. Accuracy in both timing of feeding and fasting, and instructions on caloric intake fell between 86 and 100%, for the three blog sites, and the average reliability scores fell between 85 and 95%. Another component of this project focused on a qualitative evaluation regarding statements of health benefits made in each blog article as well as the type of reference used to substantiate each health benefit claim based on a hierarchy of scientific evidence.<sup>1</sup> There were sixty seven total unique health benefit claims made in the articles from all three blog sources. One hundred percent of those claims had cited references justifying each claim. Forty three percent of the cited references were either Meta analyses and systematic reviews or randomized controlled trials. The findings show that the blog sources these personal trainers use to educate themselves on intermittent fasting are accurate and use top tiers of the hierarchy of scientific evidence to substantiate health benefit claims that are made in the articles.

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## Definition of Key Terms

- Intermittent fasting: Intermittent fasting is an umbrella term for eating patterns that cycle between voluntary fasting and non-fasting over a given period.
- Time-restricted feeding: Time-restricted feeding involves eating only during a certain number of hours each day.
- 16/8 intermittent fast: The 16/8 intermittent fast is one type of time-restricted feeding that involves fasting every day for about 16 hours and restricting your daily eating window to approximately 8 hours.
- Periodic fasting: Periodic fasting involves any period of consecutive fasting of more than 24 hours with at least one non-fasting day in between.
- 5:2 diet: The 5:2 diet is one type of periodic fasting that involves eating ad libitum for five days of the week and restricting calorie intake to 600 calories for two days of the week or restricting caloric intake to 25% of calorie needs for two non-consecutive days of the week.
- Alternate day fasting: Alternate day fasting involves alternating between a twenty-four hour fast day when a person eats less than 25% of usual energy needs, followed by a 24-hour non-fasting feast day.
- Obesity: Obesity is defined as the state of being grossly fat or overweight and associated with a body mass index equal to or greater than 30.
- Weight loss: Weight loss is a reduction of the total body mass, by loss of fluid, body fat, or lean mass.
- Blogs: Blogs are regularly updated websites or web pages run by either an individual or small group that is written in an informal style.
- Personal Trainer: A personal trainer is defined as a person who works one-on-one with a client to plan or implement an exercise or fitness regimen.

## Introduction

Obesity has reached epidemic proportions globally, with at least 2.8 million people dying each year as a result of being overweight or obese.<sup>2</sup> Obesity is serious because it is associated with poorer health outcomes and reduced quality of life. Many diets exist to try and regulate one's food intake for the purpose of reducing obesity and improving physical condition. Diet plans generally restrict quantity of calories and/or diet composition, where-as intermittent fasting does not specify what foods a person should eat or avoid. Intermittent fasting has recently become a health trend that claims to help people lose weight, improve metabolic health, and maybe even extend life span.<sup>3,4</sup> Intermittent fasting is an eating pattern that cycles between periods of eating and fasting that has been reported to facilitate weight loss and consequently improve risk factors associated with obesity and cardiovascular disease.<sup>5,6</sup>

There is a great deal of misinformation present in the media and internet-regarding intermittent fasting causing confusion and misapplication by individuals. The Global Health and Fitness Association states that more than 8.3 million health club consumers used a personal trainer in 2016, representing 12.6% of total club consumers.<sup>7</sup> Because many people use personal trainers to lose weight, it is important to look into where personal trainers are getting their sources of information to educate themselves. The reliability of the sources personal trainers use to learn about intermittent fasting impacts its application in the lives of their clients. Sources providing misinformation can result in incorrect implementation of intermittent fasting as a result. Blogs are being used to enhance health professionals' communication and information-gathering skills and are becoming increasingly prevalent in the field of health.<sup>8</sup> Personal trainers use a variety of online sources to gather information about intermittent fasting including blogs.

The accuracy of the information found on blog sources is unknown, but important to the instruction of their clients on how to use intermittent fasting. It is important to determine the accuracy of the information about intermittent fasting in blogs used by personal trainers.

The purpose of this project is to identify and determine the accuracy of common blog sources personal trainers are using to educate themselves on intermittent fasting. The study was conducted in Jeffrey's Bay, South Africa. The first objective for this project is to identify the top three blog sources used by personal trainers to educate themselves on intermittent fasting. The second objective is to create a set of criteria defined by research about the timing of feeding and fasting, and instructions on caloric intake for time-restricted feeding, periodic fasting, and alternate day fasting to evaluate accuracy of information in blog articles using manual deductive coding. The third objective is to record the health benefit claims found in each blog article and evaluate the cited references used to substantiate each claim based on a hierarchy of scientific evidence.

## Literature Review

Intermittent fasting is an eating pattern that switches between fasting and eating on a regular schedule. Time restricted feeding, periodic fasting, and alternate day fasting are three of the most common intermittent fasting methods. The 16/8 intermittent fast is one type of time-restricted feeding that involves fasting every day for about 16 hours and restricting the daily eating window to approximately 8 hours.<sup>9,10</sup> The 5:2 diet is one type of periodic fasting that involves eating ad libitum for five days of the week and restricting calorie intake to 600 calories for two days of the week or restricting caloric intake to 25% of calorie needs on two non-consecutive days of the week.<sup>11,12</sup> It does not matter which two days of the week are fast days, as long as there is at least one non-fasting day in between them. Alternate day fasting involves alternating between a twenty-four-hour fast day when the person eats less than 25% of usual energy needs, followed by a 24-hour non-fasting feast day.<sup>13</sup> Time-restricted feeding (16/8 intermittent fast), periodic fasting (5:2 diet), and alternate day fasting all show efficacy for weight loss and improvement of metabolic risk factors in research studies.<sup>14,15,16</sup>

### **History of Intermittent Fasting**

Fasting is an ancient tradition that has been practiced by many cultures and religions over centuries. Fasting is defined as the abstinence from food for varying duration, and has been associated with increased longevity and a potential beneficial role for human health.<sup>17</sup> Fasting tends to be a dietary habit among people in the context of a health-promoting dietary pattern. Intermittent fasting is an umbrella term for various meal timing schedules that cycle between voluntary fasting and non-fasting over a given period.

Intermittent fasting may have similar effects to a calorie-restriction diet and has been studied in the 21<sup>st</sup> century as a practice to possibly reduce the risk of diet-related diseases. Evidence is accumulating that eating in a time-restricted feeding can trigger a metabolic switch from glucose-based to ketone-based energy, with increased stress resistance, increased longevity, and a decreased incidence of diseases, including cancer and obesity.<sup>18</sup> Intermittent fasting may help with obesity, insulin resistance, dyslipidemia, hypertension, and inflammation.<sup>18</sup> Intermittent fasting may produce weight loss, reduce insulin resistance, and lower risk of cardio metabolic diseases, although its long term sustainability is unknown.<sup>19</sup>

There are many intermittent fasting methods that have been popularized in the media. Examples include Eat Stop Eat, the Warrior Diet, and Spontaneous meal skipping. Eat Stop Eat involves a 24-hour fast once or twice per week.<sup>20</sup> Water, coffee, and other zero-calorie beverages are allowed during the fast, but no solid foods are permitted. The Warrior Diet was popularized by fitness expert Ori Hofmekler.<sup>20</sup> It involves eating small amounts of raw fruits and vegetables during the day and eating one huge meal at night. Spontaneous meal skipping is another option for intermittent fasting that involves skipping meals from time to time, such as when you don't feel hungry or are too busy to cook and eat.<sup>21</sup> Evidence for the effectiveness of these popularized diets is limited. More long-term research on Eat Stop Eat is needed to establish efficacy, and there is limited research on use of the Warrior Diet or spontaneous meal skipping for the purpose of weight loss in overweight or obese individuals. Time restricted feeding (16/8 intermittent fast), periodic fasting (5:2 intermittent fast), and alternate day fasting have the strongest body of research showing efficacy for weight loss.

## **Evidence for Efficacy of Major Types of Intermittent Fasting**

All intermittent fasting regimens involve abstaining from eating for a set amount of time, before eating regularly again. Studies suggest that this way of eating may offer benefits such as weight loss, fat loss, reduced total cholesterol and triglycerides, reduced markers of inflammation and oxidative stress as well as possibly lowering risk factors related to heart disease and type 2 diabetes.<sup>16,22,23,24,25</sup>

### **Time-Restricted Feeding**

Time-restricted feeding is one type of intermittent fasting that limits food intake to a certain number of hours each day. Research studies show efficacy for weight loss by following time-restricted feeding, however more research needs to be conducted to establish if time-restricted feeding is more effective in weight loss compared to calorie restricted diets that allow eating throughout the day.<sup>23,26</sup> Rothschild et al. conducted a review to summarize current literature on the effects of time restricted feeding on body weight and markers of metabolic disease risk.<sup>22</sup> Both animal and human studies were included in the review. Results showed that the effect of time-restricted feeding on body weight differed between animals and humans, but the effect of time-restricted feeding on metabolic disease risk factors were similar.<sup>22</sup> A twelve-hour time-restricted feeding window produced inconsistent body weight reductions in rodents, but produced sizeable and consistent weight loss in humans. Total cholesterol and triglycerides decreased consistently in both animals and humans across all time-restricted feeding windows as well as a decrease in both glucose and insulin levels.<sup>22</sup>

The efficacy of time-restricted feeding (16/8 intermittent fast) for decreasing fat mass and improving metabolic factors independent of calorie intake was demonstrated by Moro et al. They compared the effect of time-restricted feeding (16/8 intermittent fast) on basal metabolism, maximal strength, body composition, inflammation, and cardiovascular risk factors to a normal eating pattern in resistance-trained males. Thirty-four resistance-trained males were randomly assigned to time-restricted feeding or a normal diet. Subjects were instructed to maintain their habitual caloric intake, as measured during the preliminary week of the study. During the eight-week experimental period, time-restricted subjects consumed 100% of their energy needs in an eight-hour period of time each day, with their caloric intake divided into three meals. The remaining sixteen hour per twenty-four hour period made up the fasting period. Subjects in the normal diet group consumed 100% of their energy needs divided into three meals consumed at 8a.m., 1p.m., and 8p.m.<sup>14</sup>

Subjects were tested before and after eight weeks of the assigned diet and standardized resistance training program. Both fat mass and fat free mass were assessed by dual-energy-x-ray absorptiometry and muscle area of the thigh and arm were measured using an anthropometric system. Different hormones were measured such as insulin and thyroid stimulating hormone along with bench press and leg press maximal strength, resting energy expenditure, and respiratory ratio. After eight weeks, a significantly greater decrease in fat mass in the time-restricted feeding group compared to the normal diet group was shown. Fat-free mass, muscle area of the arm and thigh, and maximal strength were maintained in both groups. Testosterone and insulin-like growth factor 1 decreased significantly in the time-restricted feeding group, with no changes in the normal diet group. Resting energy expenditure was unchanged, but a

significant decrease in respiratory ratio was observed in the time-restricted feeding group. Results from the study suggested that an intermittent fasting program in which all calories are consumed in an eight hour window each day, in conjunction with resistance training, could result in greater improvement in some health-related biomarkers, a greater decrease in fat mass, and maintain muscle mass in resistance-trained males.<sup>14</sup>

Similarly, a randomized clinical trial with 116 overweight or obese adults conducted by Lowe et al. showed a modest decrease in weight in the time-restricted eating group that was not significantly different from the decrease in the control group. This was independent of calorie intake.<sup>26</sup> Participants were randomized to a consistent mealtime group or the time-restricted eating group. The consistent meal timing group was instructed to eat 3 structured meals per day with no calorie restrictions for weight loss. The time-restricted eating group was instructed to eat ad libitum from 12p.m. until 8p.m. and completely abstain from caloric intake from 8p.m. until 12p.m. the following day. The twelve-week randomized clinical trial included men and women aged 18 to 64 years with a body mass index of 27 to 43. The primary outcome was weight loss. There was a significant difference in appendicular lean mass index between groups, but no differences in estimated energy intake between groups.<sup>26</sup> The clinical trial concluded that time-restricted feeding is not more effective in weight loss compared to eating throughout the day.

Time-restricted feeding has been shown to improve body composition, blood lipids, and reduce markers of inflammation and oxidative stress.<sup>23</sup> A four-week randomized pre-post pilot study was conducted to examine the impact of time-restricted feeding on markers of cardio-metabolic health and antioxidant status. This study also had the purpose of determining if the

adaptations from time-restricted feeding would differ under ad libitum compared to isocaloric conditions. Twenty-three healthy men were randomized to either an ad libitum or isocaloric 16/8 time-restricted feeding protocol. A total of twenty-two men completed the 28-day time-restricted feeding protocol. Time-restricted feeding in both groups was associated with significant reductions in body fat, blood pressure, and significant increases in adiponectin and HDL cholesterol. On average, total caloric intake (kcal/d) was higher in the ad libitum group compared to the isocaloric, but the difference did not reach statistical significance. The results from the pilot study in metabolically healthy, active young men, suggest that time-restricted feeding can improve markers of cardio metabolic health.<sup>23</sup>

Pellegrini et al. conducted a systematic review and meta-analysis to summarize the most recent evidence on the effects of time-restricted feeding on weight-loss in comparison with unrestricted-time regimens. All selected studies had a control group without time restriction and the hours of the fasting period in the treatment groups ranged from twelve to twenty hours with a study duration of four to eight-weeks. Time-restricted feeding resulted in greater weight-loss than control regimens, unrelated to study design. An overall significant reduction in fasting glucose concentrations was observed with time-restricted feeding regimens as well as a superior effect in weight loss compared to approaches with unrestricted time in meal consumption.<sup>27</sup>

The current research shows that time-restricted feeding without controlling calories during the feeding period results in weight loss. The majority of studies also show that when compared to a normal feeding regimen, time-restricted feeding results in greater weight and fat loss. However, there is some contradictory studies that conflict with this finding. Future research

is needed in order to draw definitive conclusions on the long-term effects of time-restricted feeding.

### **Periodic Fasting**

Periodic fasting (5:2 diet) is increasing in use in recognition of its effects on weight loss and changes in body composition being documented in research studies. Findings from research studies consistently show effects on weight loss and improvements in metabolic biomarkers in participants following the 5:2 diet, but does not show its advantage for weight loss compared to continuous calorie restriction (daily energy deficit of around 20%) or a standard energy-restricted diet (500 calories per day). Conley et al. conducted a randomized pilot study to determine whether the 5:2 diet can achieve  $\geq 5\%$  weight loss and greater improvements in weight and biochemical markers than a standard energy-restricted diet in obese male war veterans. A total of 24 participants were randomized to consume either the 5:2 diet (two non-consecutive days of 600 calories and 5 days of ad libitum eating per week) or a standard energy-restricted diet (500 calories per day) for six months. After six months, participants in both groups significantly reduced body weight and systolic blood pressure. Mean weight loss was  $5.5 \pm 3.2\%$  for the 5:2 group and  $5.4 \pm 4.2\%$  for the standard energy-restricted diet group. Results suggest that the 5:2 diet is successful but not a superior weight loss approach in male war veterans when compared to a standard energy-restricted diet.<sup>15</sup>

A longer randomized controlled trial showed similar findings. The study compared the effects of a 5:2 intermittent fast to a continuous calorie restricted diet regarding weight loss, anthropometric and body composition measures, adipose tissue gene expression and circulating metabolic biomarkers.<sup>12</sup> One hundred and fifty overweight and obese nonsmokers aged 35-65

years were randomly assigned to an intermittent calorie restriction group, a continuous calorie restriction group, or a control group and participated in a twelve-week intervention phase, a twelve-week maintenance phase, and a twenty-six-week follow-up phase. The 5:2 intermittent calorie restriction group consisted of five days without energy restriction and two days with a 75% energy deficit and a net weekly energy deficit of around 20%. The continuous calorie restriction group consisted of a daily energy deficit of around 20% and the control group had no advice to restrict energy. Similar to the Conley study, the 5:2 Intermittent calorie restriction did not exert stronger effects on circulating biomarkers or body weight loss among overweight or obese adults, during the twelve-week intervention phase, the twelve-week maintenance phase, or the twenty-six-week follow up phase compared to the continuous calorie restriction group. With respect to the comparison of intermittent calorie restriction and continuous calorie restriction with the control regimen, the control group also showed moderate initial weight loss, although energy restriction was not explicitly recommended. There were no significant differences in the expression of preselected genes implicated in energy and macronutrient metabolism between the intermittent calorie restriction group and the continuous calorie restriction group. Results on the effects of the 5:2 intermittent fast indicate that intermittent calorie restriction may be equivalent but not superior to continuous calorie restriction for weight reduction and prevention of metabolic diseases.<sup>12</sup> Further investigations are needed on the effectiveness, practicality, and safety of intermittent calorie restriction for patients with chronic diseases, such as type 2 diabetes, cardiovascular disease, or cancer.

Finally, Cioffi et al. conducted a systematic review and meta-analysis to summarize the most recent evidence on the efficacy of intermittent energy restriction versus continuous energy

restriction on weight loss, body composition, blood pressure and other cardio metabolic risk factors.<sup>24</sup> Eleven trials were included and all selected intermittent regimens provided  $\leq 25\%$  of daily energy needs on “fast” days but differed for type of regimen (5:2 or other regimens). The intermittent approach resulted in a comparable weight-loss when compared to a continuous approach. A slight reduction in fasting insulin concentrations was evident with intermittent energy restriction regimens, but the meta-analysis did not show significant between-arms difference in lipid values and arterial blood pressure. It was concluded that both intermittent and continuous energy restriction achieved a comparable effect in promoting weight loss and metabolic improvements.<sup>24</sup>

The current research shows that periodic fasting (5:2 diet) following two non-consecutive days of 600 calories and 5 days of ad libitum eating per week or restricting caloric intake to 25% of calorie needs for two non-consecutive days of the week are effective for weight loss and metabolic improvements, but not superior to continuous calorie restriction (daily energy deficit of around 20%) or a standard energy-restricted diet (500 calories per day).

### **Alternate-Day Fasting**

Alternate-day fasting is an intermittent fasting approach that may promote weight loss and may lower risk factors related to heart disease and type 2 diabetes.<sup>16</sup> A single-center randomized clinical trial of obese adults (18 to 64 years of age; mean body mass index, 34) was conducted between October 1, 2011, and January 15, 2015, to compare the effects of alternate-day fasting versus daily calorie restriction on weight loss, weight maintenance, and risk indicators for cardiovascular disease.<sup>25</sup> Participants were randomized to one of three groups for one year: alternate-day fasting (25% of energy needs on fast days; 125% of energy needs on alternating

“feast days”), calorie restriction (75% of energy needs every day), or a no-intervention control. The trial involved a 6-month weight loss phase followed by a 6 month weight maintenance phase. The primary outcome was change in body weight. Secondary outcomes were adherence to the dietary intervention and risk indicators for cardiovascular disease.<sup>25</sup>

During the 6-month weight-loss phase, the intervention groups were instructed to reduce their energy intake by a mean of 25% per day. To achieve this reduction, the alternate-day fasting group was instructed to consume 25% of baseline energy intake as a lunch (between 12 PM and 2 PM) on fast days and 125% of baseline energy intake split between 3 meals on alternating feast days. The daily calorie restriction group was instructed to consume 75% of baseline energy intake split between 3 meals every day. Participants in the control group were instructed to maintain their weight throughout the trial and not to change their eating or physical activity habits. Mean weight loss was similar for participants in the alternate-day fasting group and those in the daily calorie restriction group at month 6 and month 12 relative to those in the control group. Weight loss was not significantly different between the alternate-day fasting group and the daily calorie restriction group at month 6. At the end of the study, there was no significant difference for total weight loss between the intervention groups relative to controls. There were no statistically significant differences between the alternate-day fasting group and the daily calorie restriction group for fat mass, lean mass, or visceral fat mass at month 6 or month 12. Blood pressure and total cholesterol levels were not significantly different between the intervention groups, or relative to controls, at month 6 or month 12. The results of this randomized clinical trial demonstrated that alternate-day fasting resulted in equivalent weight loss compared to the daily restriction diet.<sup>25</sup>

Alternate day fasting has been shown to be effective for weight loss and cardio-protection in obese individuals.<sup>28,29</sup> Whether these effects occur in normal weight and overweight individuals remains unknown.<sup>16</sup> Only a handful of studies have been performed to test the effects of alternate day fasting on body weight and coronary heart disease risk reduction, and almost all of these studies have been undertaken in obese populations.<sup>28,29,30</sup> Only two human studies have tested the effect of alternate day fasting on body weight and coronary heart disease risk in non-obese subjects, but they were limited by their short durations and their lack of a control group.<sup>31,32</sup>

Varady et al. examined the effect of alternate-day fasting on body weight, body composition, and coronary heart disease risk parameters in both normal weight and overweight adults in a twelve week randomized controlled feeding trial.<sup>16</sup> Subjects were randomized to either an alternate day fasting group or a control group for twelve weeks. Alternate day fasting subjects consumed 25% of their baseline energy needs on the fast day (24 hours), and ate ad libitum on each alternating feed day (24 hours). Timing of feed and fast days, as well as hours of intake during fast days was standardized.

Body weight decreased significantly in the alternate day fasting group relative to the control group by week 12. Fat mass was reduced in the alternate day fasting group and fat free mass did not change, versus controls. Total cholesterol concentrations and systolic and diastolic blood pressure decreased within the alternate day fasting group, but no significant between-group differences were noted. The findings of the study suggested that alternate day fasting is effective for weight loss and cardio-protection in normal weight and overweight adults, though

further research implementing larger sample sizes is required before solid conclusions can be reached.<sup>16</sup>

A second pilot study evaluating the feasibility and effects of alternate day fasting on non-obese subjects showed that significant weight and fat loss occurred despite instructions to increase intake on feeding days, and that hunger on fasting days may make long-term use of the alternate day fasting unfeasible. In this study, eight non-obese men and eight non-obese women aged between 23 and 53 years fasted every other day for twenty-two days. The subjects had different levels of physical activity.<sup>33</sup> Data such as body weight, body composition, and insulin was collected at baseline and following three weeks of alternate day fasting on two consecutive days, following a “feast” day and following a “fast” day. After baseline testing was completed, the subjects fasted from midnight to the subsequent midnight on alternating days for twenty-two days.<sup>33</sup>

Results showed that subjects lost  $2.5 \pm 0.5\%$  of their initial body weight and  $4.1 \pm 1\%$  of their initial fat mass. Fat oxidation increased from 64 grams per twenty-four hours at baseline to 101 grams per twenty-four hours. Fasting insulin was lower on day 22 in both the men and the women. Heilbronn et al. concluded that alternate day fasting was feasible for short time periods in non-obese subjects, and fat oxidation increased however hunger on fasting days did not decrease perhaps indicating that alternate day fasting may be unlikely to continue as an intermittent fasting diet.<sup>33</sup>

Alternate day fasting proves efficacy for weight loss, reduced fat mass, and provides cardio-protection in normal weight and overweight adults, but it may be difficult to continue

long-term because of hunger that is experienced on fasting days. Alternate day fasting is not a superior method of eating compared to daily calorie restriction. Further research needs to be conducted to determine the long-term consequences of alternate day fasting in both overweight and obese individuals and nonobese individuals.

Research has shown that intermittent fasting is effective in helping people lose weight.<sup>34</sup> Time-restricted feeding, periodic fasting, and alternate day fasting are three intermittent fasting methods that are effective for weight loss in both obese and nonobese individuals and may reduce the risk of chronic disease. Intermittent fasting may also favorably influence an array of cardio metabolic health indices.<sup>35</sup> All three intermittent fasting methods prove to be effective for weight loss, but intermittent fasting is not a superior weight loss approach compared to daily calorie restriction or a standard energy-restricted diet.

### **Evidence for Efficacy of Intermittent Fasting For Treating Obesity Related Diseases**

Effective weight-loss strategies are required because of the increasing incidence of overweight and obesity worldwide and its relationship with a number of disease states such as type 2 diabetes, cardiovascular disease, and cancer.<sup>36</sup> A daily energy restriction of 625 kcal is considered the best dietary strategy for weight reduction, with a greater restriction often considered for individuals classified as obese or with additional comorbidities. Despite daily energy restriction being the current best practice for weight loss, there is a high likelihood of regaining weight in the long term, so alternative forms of effective weight loss are of interest.<sup>36</sup>

Various research studies show the effectiveness of intermittent fasting for weight loss and treating obesity.<sup>37,36</sup> A systematic review was conducted to examine the evidence for

intermittent fasting in treating obesity in Canada. The twenty seven trials included in the review found weight loss of 0.8% to 13.0% of baseline weight in those following intermittent fasting with no serious adverse events.<sup>37</sup> Five studies enrolled patients with type 2 diabetes and documented improved glycemic control with intermittent fasting. In both diabetic and non-diabetic populations, cardiovascular risk factors were reduced. When diet composition was controlled, most protocols were consistent with Health Canada and American Heart Association guidelines at the time which consisted of 55% carbohydrates, 20% fat, and 25% protein. In all twenty seven trials, intermittent fasting resulted in weight loss and weight loss occurred regardless of changes in overall caloric intake.<sup>37</sup>

Study interventions from the trials that were included in the systematic review incorporated intermittent fasting in a variety of ways, from a 24-hour fast several days per week (5:2 intermittent fast) to a daily 16-hour fast (time-restricted intermittent fast). The most common study design was to alternate 24-hour periods of fasting with unrestricted consumption (alternating fast and feeding days). Some studies restricted calories while others allowed ad libitum consumption when not fasting. The rigor of fasting also varied, with several studies allowing 25% of regular caloric consumption during fasting periods. Comparator groups to intermittent fasting diets followed a usual diet or calorie-restricted diet.<sup>37</sup>

Twelve studies used calorie-restricted diets as a comparison to intermittent fasting and found equivalent weight loss in both groups. In several of the studies, those in the intermittent fasting group consumed the same amount of calories, or less than those in the calorie-restriction group. In a direct comparison of 88 participants over 8 weeks, intermittent fasting combined with

restricting calories to 30% less than their calculated energy requirements led to a greater weight loss versus intermittent fasting alone.<sup>37</sup> The practical length of a fast to effect changes in weight appears to be 16 hours. In intermittent fasting studies with a daily fasting intervention (time-restricted intermittent fast), a total of 120 participants were able to maintain a minimum daily fast of about 16 hours, with an 8-hour feeding window each day. It was found that combining exercise with intermittent fasting improved weight loss in a study consisting of 64 obese patients.<sup>37</sup> Researchers concluded that intermittent fasting shows promise for the treatment of obesity, but long term research is needed to understand the sustainable role intermittent fasting can play in weight loss.<sup>37</sup>

An earlier systematic review was produced regarding intermittent fasting and found significant weight loss. Eight studies that assigned overweight or obese adults to intermittent fasting were deemed eligible for inclusion. Four of the studies were randomized controlled trials and four were clinical controlled trials. The length of treatment ranged from 5 weeks to 12 months, with 18 months being the maximum follow-up time. The structure of the intermittent fasting protocol varied across the 8 studies. Alternate fasting was prescribed in a couple studies and in other studies, patterns of two or four consecutive fast days per week followed by consecutive feed days were used. All but two studies prescribed equal total energy consumption between the diets.<sup>36</sup>

All studies reported weight loss for groups of participants that followed intermittent fasting. The average weight loss reported was approximately 0.2-0.8 kg per week. The weight loss seen in the participants were compared to a daily energy restriction diet and researchers

found that intermittent fasting was as effective as daily energy restriction for weight loss. The systematic review finds that intermittent fasting may be an effective alternative strategy for health practitioners to promote weight loss for overweight and obese people.<sup>36</sup>

### **Using Blogs as Research**

Upon review of the literature, research was not found regarding current application of intermittent fasting in a healthcare setting nor research talking about misinformation and misapplication by personal trainers. There are blogs written about common mistakes that the public makes when trying out intermittent fasting and how to avoid them. A global increase in and prevalence of social media is stimulating interest in the utilization of blogs for research purposes.<sup>38</sup> Blogs have potential to be used as a qualitative health research tool for a range of purposes including data collection. Blogs have particular application for researchers accessing populations beyond their physical reach.<sup>38</sup> Blogs are emerging and being used to enhance health professionals' communication and information-gathering skills.<sup>39</sup> Healthcare professionals are expected to be competent in the use of information technology to be able to effectively communicate and manage information, but more research needs to be conducted regarding the use of blogs as an interactive and effective educational method.<sup>39</sup>

Blogs can be used as an integrated eLearning tool and platform which will allow educators to expand access to educational content, promote engagement with students, and allow for students to access educational material at a time, place, and pace that suits them.<sup>40</sup> Apart from being a cost effective tool and platform, blogs offer the possibility of creating a hyperlinked indexed content repository for both created and curated educational material. Blogs can provide

a structured template for teaching processes that can be reproduced if educational practices are incorporated. Personal trainers may use blogs as one source of health information and use it to promote engagement with clients by referring the same blog sources for education on intermittent fasting.

### **Analyzing Qualitative Data Using Deductive Coding**

Qualitative data analysis is the process of examining and interpreting qualitative data to understand what it represents. One can use a deductive approach to developing a code structure, which starts with an organizing framework for the codes.<sup>41</sup> The initial step defines a structure of initial codes before the line-by-line review of the data. Preliminary codes can help researchers integrate concepts already well known in the literature. As an example, a deductive approach of health service use might begin with predetermined codes for predisposing, enabling, and need factors based on the behavioral model.<sup>41</sup> There is diversity in how to develop a code structure and if a code structure is well-crafted and clear, then it will promote the quality of subsequent analysis.<sup>41</sup> Qualitative analysis has been used to evaluate content of websites and social media sites.<sup>42,43</sup>

### **The importance of Using Reliable Sources of Information for Educational Purposes**

Reliable sources are accurate and based on strong evidence. It is important to use reliable resources for educational purposes, particularly when the knowledge is to be applied. Peer review involves subjecting the author's scholarly work and research to the scrutiny of other experts in the same field to check its validity and evaluate its suitability for publication.<sup>44</sup> Articles published in peer-reviewed sources are, by definition, more reliable and of a higher standard than articles published in non-peer reviewed sources.<sup>45</sup> Educating oneself and others using

reliable sources is recommended, so accurate and credible information can be learned and passed on to others.

Evaluating online educational resources for reliability and accuracy is important because more people, including personal trainers, are using the sources for education. There are multiple guides and methods for evaluating the reliability of online information resources. The CRAP test, developed by Molly Beestrum is one tool for deciding if a website is a credible, valid source.<sup>46,47</sup> The CRAP test looks at four major areas to evaluate a website for credibility; currency, reliability, authority, and objectivity. Currency evaluates how recent the information is on the website. Reliability focuses on the kind of information included in resources provided on the website. Authority focuses on the qualifications and credentials of the creator or authors, and objectivity focuses on potential bias of the authors and website.<sup>46,47</sup> Other guides exist to help consumers evaluate websites for credibility that focus on the same areas as Beestrum in addition to audience, relevance, and perspective.<sup>48,49,50</sup>

Internet sources are becoming increasingly important in seeking health information, such that they may have a significant effect on health care decisions and outcomes.<sup>51</sup> Given the wide range of different sources of web-based health information from different organizations and individuals, it is important to understand how information seekers evaluate and select the sources that they use and how they assess their credibility and trustworthiness. Sbaffi et al. reviewed empirical studies on trust and credibility in the use of web-based health information with the objective of identifying factors that impact judgements of trustworthiness and credibility.<sup>51</sup> A systematic review was conducted using a combination of terms such as web-

based health information, trust, and credibility. Findings showed that website design, clear layout, interactive features, and the authority of the owner all have a positive effect on trust or credibility, whereas advertising has a negative effect.<sup>51</sup> Further research needs to be conducted regarding the impact of demographic variables such as age, income, and gender that may influence web-based health information seeking behaviors. Information seekers may also use personal trainers as a credible and trustworthy source of information regarding health.

### **Sources of Information Personal Trainers Use for Education**

Personal trainers are a resource for the general public to obtain exercise information, exercise prescription, and guidance.<sup>52</sup> Personal trainers specialize in the assessment of an individual's fitness level and the design and supervision of exercise programs tailored to individual fitness goals such as weight reduction.<sup>52</sup> Stacey et al. conducted a study to investigate approaches for translating evidence-based knowledge for use by personal trainers. A systematic review of studies about knowledge translation interventions targeting personal trainers was conducted. Out of 634 citations, two studies were eligible for inclusion: a survey of 325 registered health fitness professionals and a qualitative study of ten fitness instructors.<sup>52</sup> Both studies identified that personal trainers obtain information from textbooks, networking with colleagues, scientific journals, seminars, and mass media. The studies identified did not evaluate interventions to translate evidence-based knowledge for personal trainers and did not explore factors influencing uptake of evidence in their practice. Further research is needed to better understand how emerging health-fitness evidence can be translated to maximize its use by personal trainers providing services to the public.<sup>52</sup>

More and more people are seeking the expertise of personal trainers in recent years.<sup>53</sup> Because personal trainers are being used more, it is important to look into what sources of information personal trainers are using for education on intermittent fasting. Trust plays an important role in the relationship between personal trainer and trainee. Bonnie et al. aimed to explore the development of the mutual trust relationship between trainers and trainees. Fifteen trainers and 34 trainees voluntarily participated in focus group discussions. The study aimed to gain insight into the factors involved in the development of a mutual trust relationship between trainers and trainees. Results showed that trainees trust their trainer based on the trainer's availability and accessibility and the personal relationship between the trainee and their trainer.<sup>54</sup> In addition to these qualities, knowledge of personal trainers and effectiveness of their recommendations is important. Trainers should use accurate information sources to educate themselves on health related topics, including intermittent fasting, in order to provide evidence based guidance to their clients as they seek to improve health.

## Methodology

This project was conducted in two phases. In phase one of the project, individual semi-structured phone interviews were conducted with a small population of personal trainers at a local gym located in Jeffrey's Bay, South Africa. The three most frequently referenced blog sources by these personal trainers to educate themselves on intermittent fasting were identified. Phase two of the project evaluated the three blog sources for information accuracy about three intermittent fasting techniques, time restricted feeding, periodic fasting, and alternate day fasting using manual deductive qualitative coding. In addition, the project evaluated the cited references used to substantiate each health benefit claim based on a hierarchy of scientific evidence. This project was not considered human subjects research and did not require IRB oversight according to VT IRB determination.

### **Phase 1: Semi-Structured Interview**

The Edge Fitness Club is a local gym located in Jeffrey's Bay, South Africa and currently has five personal trainers working there. Each personal trainer was contacted to describe the project and obtain permission to conduct the interview. The phone number of trainers agreeing to an interview were acquired and a time set up for the one-on-one semi-structured phone interviews. An interview guide was developed that had four areas of inquiry, 1) the sources trainers use to educate themselves about health and fitness topics, 2) their reason for choosing particular information sources, 3) the sources trainers have used to educate themselves on intermittent fasting and 4) if they use any blog sources to educate themselves on intermittent fasting and why they chose those blog sources. A primary question was developed for each area

with additional probing questions. The questions and responses from the one-on-one semi-structured interviews were documented via detailed handwritten notes. A copy of the interview guide is found in Appendix A.

### *Inductive Thematic Content Analysis*

Inductive thematic content analysis was applied to the detailed notes taken during the interviews to analyze the qualitative data. Codes were derived from analysis of the detailed notes and then common themes were generated, reviewed, and defined.<sup>55</sup>

## **Phase 2: Scan of Blogs for Accuracy**

### *Identification of Blog Sources*

The top three blog sources the personal trainers use to educate themselves on intermittent fasting were determined based on frequency of mention from the interviews. Once the top three blog sources were determined, a search of each blog was conducted using pre-defined search terms that relate to intermittent fasting.

### *Selection of Articles from the Blogs for Scan of Accuracy*

Three pre-determined search terms were used to identify articles that were then scanned for information accuracy. The terms chosen were, 16/8 intermittent fast, 5:2 diet, and alternate day fasting because they define three common intermittent fasting methods that have the strongest body of evidence-based research.

Intermittent fasting was not used as a search term because it is an umbrella term for all eating patterns that include periods of reduced calorie intake over a defined period in addition

to time-restricted feeding (16/8 diet), periodic fasting (5:2 diet), and alternate day fasting. Using intermittent fasting as a search term would retrieve too many irrelevant articles that are out of the scope for this project.

Articles on the blog source were evaluated for accuracy of information in two key criteria: timing of feeding and fasting, and instructions on caloric intake. Statements of health benefits made within the article were recorded from each blog article as well as the type of reference used to substantiate each health claim. The type of reference used to support the health claims was recorded and labeled based on a hierarchy of scientific evidence.<sup>1</sup> Articles were sorted by date in the search engine of each blog source. Those articles that contained content in both criteria areas was included in the evaluation. The total number of articles identified for each search term was documented and up to a maximum of ten articles for each search term were evaluated. Authors of each blog article were documented and their background expertise was looked into. Articles on the blog source were assessed for reliability as a combination of accuracy to the two criteria and use of peer-reviewed publications.

Information considered accurate for the two key criteria: timing of feeding and fasting, and instructions on caloric intake for each intermittent fasting method was based on evidence from the literature showing efficacy for weight loss. Research studies showing efficacy of the 16/8 intermittent fast had participants fast for sixteen hours and eat ad libitum for the remaining eight-hour window with no calorie restriction.<sup>14,26,23,27</sup> Research studies focusing on the 5:2 diet had participants fast for 24 hours 2 days a week with at least one non-fasting day in between. Participants restricted their calorie intake to 600 calories or 25% of calorie needs on the two fast

days and ate ad libitum the remaining 5 days of the week.<sup>12, 24,56</sup> Alternate day fasting has been shown to be effective for weight loss in obese individuals that consumed 25% of their calorie needs on the fast day (24 hours), and then ate ad libitum on each alternating feed day (24 hours).<sup>16,25,33</sup>

### *Tracking Articles Identified*

Perma.cc software was used to maintain a permanent record of articles downloaded and analyzed, so that there is a permanent copy in case the webpage is altered or removed in the future. See Appendix B for a detailed list of Perma URL links.

### *Manual Deductive Qualitative Coding*

Deductive qualitative coding was applied to the review of the articles to assess the accuracy of blog content.<sup>34,41</sup> Qualitative coding is a process of systematically categorizing excerpts in the qualitative data in order to find themes and patterns.<sup>57</sup> Deductive coding is a top down approach where one starts with a set of predetermined codes and then finds excerpts that fit those codes.<sup>57</sup> Predefined codes for the timing of feed/fast, and instructions on caloric intake for each type of intermittent fasting were defined for use during the review.

### *Analysis Process for Each Blog Source*

Reliability of information from each blog was assessed through a review of the articles within the blog for content accuracy, rating of information sources cited in the articles, and calculation of a final reliability score. A search of each blog was conducted using the predetermined search terms. Up to ten relevant articles containing the search terms were

analyzed for accuracy. The two areas of information that were analyzed for accuracy are timing of feeding and fasting, and instructions on caloric intake for time-restricted feeding specifically focusing on the 16/8 intermittent fast, periodic fasting specifically focusing on the 5:2 diet, and alternate day fasting.

Accuracy of the information provided in the blog article for timing of feed/fast, and instructions on caloric intake for each type of intermittent fasting method was rated as either “accurate” or “inaccurate.” A criteria within an article was considered *accurate* if the information provided about the criteria within the article was entirely accurate. A criteria was considered *inaccurate* if any of the information provided about the criteria within the article was entirely inaccurate or some important detail was missing. The percent accuracy of the articles for each criteria by type of intermittent fasting in each blog was calculated by taking the number of articles determined to be accurate for the criteria (timing of feed/fast and instructions on caloric intake) divided by the total number of articles reviewed.

The types of references used to substantiate information in each blog article was categorized as peer-reviewed, not peer-reviewed, can’t tell, or NA. Peer-reviewed was when the resource referenced by the blog was a scientific article published by a peer-reviewed academic journal. Not peer-reviewed was if the resource referenced by the blog was anything other than a peer-reviewed academic journal. The potential option of “can’t tell” was recorded if the reviewer could not determine whether the resource referenced was peer-reviewed or not, and NA was recorded if the blog article did not attribute information related to intermittent fasting to another resource or no references were provided. (See Appendix C) The percent of articles

using peer reviewed references for each type of intermittent fasting in each blog was calculated. A reliability score for each type of fasting within each blog was calculated using the following formula:

$$\text{Fasting Type Reliability Score} = (\% \text{ accuracy for timing} + \% \text{ accuracy for caloric intake} + \% \text{ articles using peer reviewed references})/3$$

An average reliability score for each blog source was calculated using the following formula:

$$\text{Blog Average Reliability Score} = (\% \text{ accuracy for timing of all fasting types} + \% \text{ accuracy for caloric intake of all fasting types} + \% \text{ articles using peer reviewed references for all fasting types})/3$$

The health claims made in each blog article were documented, the citations used to substantiate the claims identified, and ranked by research method according to the hierarchy of evidence.<sup>1</sup> A comparison of the number of health claims and the types of citations used for all three blogs was made.

## Results

### Phase 1 Results

Five personal trainers working at the Edge Fitness Club were approached for interviews, and all five agreed. There was a total of 8 information sources the personal trainers use for education on health and fitness topics and a variety of reasons why that are included in Table 1. All personal trainers use co-workers and four out of five trainers use blogs making co-workers and blogs the top two sources of information for education on health and fitness topics. Other sources of information used were Tik Tok, Instagram, Textbooks, You Tube, Documentaries, and Magazines.

Information source	# of Trainers Using the Source	Reasons trainers gave for using each source
Co-workers	5	<ul style="list-style-type: none"><li>• Learning from each other is beneficial.</li><li>• Find out what information sources everyone is using in general to learn about health and fitness topics.</li></ul>
Blogs	4	<ul style="list-style-type: none"><li>• Use blogs to learn new information on a topic.</li><li>• Use blogs to learn about new health trends.</li><li>• Blogs are regularly updated.</li><li>• Blogs can be entertaining.</li></ul>
Tik Tok	3	<ul style="list-style-type: none"><li>• Videos are short and informative.</li><li>• Follow health experts that give good information and advice.</li></ul>
Instagram	2	<ul style="list-style-type: none"><li>• Follow registered dieticians for useful health information.</li><li>• Follow health experts that provide information on recent research that has been released on health and fitness topics.</li></ul>

Textbooks	2	<ul style="list-style-type: none"> <li>• Belief that it is hard to get in depth knowledge about a topic without reading books.</li> <li>• Preferred method of learning and gaining knowledge is reading textbooks.</li> </ul>
You Tube	1	<ul style="list-style-type: none"> <li>• Likes to watch and listen to videos and take notes.</li> </ul>
Documentaries	1	<ul style="list-style-type: none"> <li>• Provide a lot of information on a topic and adds depth to understanding on the topic.</li> </ul>
Magazines	1	<ul style="list-style-type: none"> <li>• Health magazines specifically provide useful information to help people live a healthy lifestyle.</li> </ul>

The sources of information trainers have used to educate themselves on intermittent fasting were the same as the sources trainers use to educate themselves about health and fitness topics. Because intermittent fasting is a new health trend, each trainer thought that their go to sources for education on health and fitness topics would also be able to provide them information on intermittent fasting.

A total of twelve blog sources were used by trainers. The three most frequently referenced blog sources that trainers used to educate themselves on intermittent fasting were Medical News Today, Simple Life, and Harvard Health Blog. The blog sources used by each personal trainer to educate themselves on intermittent fasting are displayed in Table 2.

Table 2. Blogs Used by Personal Trainers to Educate Themselves on Intermittent Fasting	
Trainer	Blogs
1	None
2	Medical News Today, Mind Body Green, and Health line
3	Simple Life, The Sporting Blog, and Harvard Health Blog
4	Medical News Today, Everyday Health, and In Body
5	Simple Life, Harvard Health Blog, and Better Me.

Four personal trainers used three different blog sources each to educate themselves on intermittent fasting, and one trainer did not use blogs for this purpose. The two trainers that used Medical News Today to educate themselves on intermittent fasting chose that blog source because they believe that the information from Medical News Today is science based and they enjoy diving deeper into the cited references that substantiate health claims made in the articles. The two personal trainers that chose Simple Life to educate themselves on intermittent fasting indicated that they use it because Simple Life is organized into categories, so these personal trainers found it easy to access information about different intermittent fasting techniques and enjoyed the style of writing in each blog article. Reasons provided by the two trainers that used Harvard Health blog were that they believe Harvard Health is a reliable information source due to the prestige of Harvard and its reputation as a trusted source for medical information.

Reasons provided for using the other blog sources for education included that they considered blog sources only as one source of health information, they were interested in seeing what various sources were saying on the health and fitness topic, and wanted to compare the information from various sources.

## **Phase 2 Results**

Thirty-eight relevant articles were reviewed across the three blog sites that contained information regarding both criteria. Out of all articles reviewed in all three blogs for all intermittent fasting methods, 35 were found to be accurate for both timing for fast/feed and instructions on caloric intake and 3 articles were found to be inaccurate for both timing for fast/feed and instructions on caloric intake. All three blog sources had one inaccurate article each

for timing of feed/fast. Medical News Today had two inaccurate articles and Simple Life had one inaccurate article for instructions on caloric intake. (See Table 3)

Table 3. Information Accuracy by Fasting Type and Blog Source*						
Blog Name	Fasting Type	# of relevant articles	Timing for fast/feed		Caloric Intake	
			Accurate (N)	Inaccurate (N)	Accurate (N)	Inaccurate (N)
Medical News Today	16/8 intermittent fast	8	8	0	7	1
	5:2 diet	6	6	0	6	0
	Alternate day fasting	4	3	1	3	1
Simple Life	16/8 intermittent fast	5	4	1	4	1
	5:2 diet	3	3	0	3	0
	Alternate day fasting	5	5	0	5	0
Harvard Health Blog	16/8 intermittent fast	4	4	0	4	0
	5:2 diet	2	2	0	2	0
	Alternate day fasting	1	0	1	1	0
<b>Total</b>		<b>38</b>	<b>35</b>	<b>3</b>	<b>35</b>	<b>3</b>
<p>*Accuracy Criteria: 16/8 Intermittent fast – Timing = 16 hrs fast, 8 hrs feast; Calories = ad libitum feast            5:2 diet – Timing = 5 days feast, 2 non-consecutive days fast; Calories = ad libitum feast, &lt;600 or 25% baseline calories fast            Alternate day fast – Timing = Alternate feast and fast days; Calories = ad libitum feast, 25% of baseline calories fast</p>						

Between 232 and 260 articles were found in the three blogs, 260 articles each in Medical News Today and Simple Life, and 232 in Harvard Health Blog. Of these, only 18 articles fit the criteria for selection from Medical News Today, 13 articles fit the criteria for selection from Simple Life, and 7 articles fit the criteria for selection from Harvard Health Blog. Dates for the articles appeared from newest to oldest for each intermittent fasting type in each of the three blog sources. (See Table 4)

Table 4. Data Regarding Articles that were Selected for Analysis				
Blog Name	Fasting Type	Total number of articles that came up with each search	Number of articles that fit criteria for selection	Date Ranges of Selected Articles (newest to oldest)
Medical News Today	16/8 intermittent fast	60	8	February 6th, 2021- June 20th, 2018
	5:2 diet	100	6	April 6th, 2021- July 27th, 2015
	Alternate day fasting	100	4	August 26th, 2020- September 1st, 2019
	<b>Total:</b>	<b>260</b>	<b>18</b>	
Simple Life	16/8 intermittent fast	80	5	February 28th, 2020- January 15th, 2020
	5:2 diet	80	3	January 27th, 2020- January 16th, 2020
	Alternate day fasting	100	5	May 15th, 2020- February 7th, 2020
	<b>Total:</b>	<b>260</b>	<b>13</b>	
Harvard Health Blog	16/8 intermittent fast	4	4	October 30th, 2020- September 13th, 2018
	5:2 diet	222	2	July 1st, 2020- July 31st, 2019
	Alternate day fasting	6	1	December 4th, 2020
	<b>Total:</b>	<b>232</b>	<b>7</b>	

Review of the articles for accuracy showed that Medical News Today had the highest average percent accuracy for timing of feed/fast with 94%, but the lowest average percent accuracy for instructions on caloric intake with 89%, Harvard Health blog had the lowest average percent accuracy for timing of feed/fast with 86%, but the highest average percent accuracy for instructions on caloric intake with 100%, and Simple Life fell between these two for both timing of feed/fast and caloric intake at 92%. The Harvard Health blog had the highest average reliability score at 95%, followed closely behind by Medical News Today at 94%. Simple Life had the lowest average reliability score at 85% due to their relatively lower use of peer reviewed references (69%). (See Table 5)

Blog Name	Fasting type	Total articles reviewed	Number of accurate articles for timing of feed/fast	Timing of feed/fast - accurate %	Number of accurate articles for caloric intake	Caloric Intake - accurate %	Type of Reference - peer-reviewed	Type of Reference - peer-reviewed %	Average reliability%*
Medical News Today	16/8 intermittent fast	8	8	100%	7	88%	8	100%	96%
	5:2 diet	6	6	100%	6	100%	6	100%	100%
	Alternate day fasting	4	3	75%	3	75%	4	100%	83%
	<b>Average</b>	<b>18</b>	<b>17</b>	<b>94%</b>	<b>16</b>	<b>89%</b>	<b>18</b>	<b>100%</b>	<b>94%**</b>
Simple Life	16/8 intermittent fast	5	4	80%	4	80%	4	80%	80%
	5:2 diet	3	3	100%	3	100%	3	100%	100%
	Alternate day fasting	5	5	100%	5	100%	2	40%	80%
	<b>Average</b>	<b>13</b>	<b>12</b>	<b>92%</b>	<b>12</b>	<b>92%</b>	<b>9</b>	<b>69%</b>	<b>85%**</b>
Harvard Health Blog	16/8 intermittent fast	4	4	100%	4	100%	4	100%	100%
	5:2 diet	2	2	100%	2	100%	2	100%	100%

	Alternate day fasting	1	0	0%	1	100%	1	100%	67%
	<b>Average</b>	<b>7</b>	<b>6</b>	<b>86%</b>	<b>7</b>	<b>100%</b>	<b>7</b>	<b>100%</b>	<b>95%**</b>

\*Formula for calculating reliability for each type of fasting: (% accuracy for timing + % accuracy for caloric intake + % articles using peer reviewed references)/3 = Reliability score

\*\*Formula for calculating average reliability score for each blog source: (Total% accuracy for timing + Total% accuracy for caloric intake + Total% articles using peer reviewed references)/3 = Average reliability score for blog source

The number and type of references cited to substantiate health claims made in the blog articles are detailed in Table 6. The references were classified according to the hierarchy of scientific evidence.<sup>1</sup> Review articles did not fall into the hierarchy, and were identified separately. A total of 67 citations were found in the 38 articles reviewed, with twenty-two of those being review articles. Over half of the articles (n=35) were in Medical News today. Of these, 37% (n=13) were higher order studies (randomized controlled trials or systematic reviews), 26% (n=9) were animal or in vitro studies, and 31% (n=11) were review studies. Of the 19 citations in articles in Simple Life, 26% (n=5) were higher order studies, 16% were animal or in-vitro studies, or case reports/opinion papers, and 47% (n=9) were review articles. Finally, 85% (n=11) of the citations in Harvard Health Blog were higher order studies, and 15% (n=2) were review studies. (See Table 6)

Table 6. Types of References Used to Substantiate Health Claims

Blog name	Number of citations	Meta analyses and systematic reviews	Randomized controlled trials	Cohort studies	Case-control studies	Cross-sectional studies	Animal trials and <i>in vitro</i> studies	Case reports, opinion papers, and letters
Medical News Today	35	4	9	2	0	0	9	0
Simple Life	19	3	2	0	2	0	2	1
Harvard Health Blog	13	0	11	0	0	0	0	0
<b>Total</b>	<b>67</b>	<b>7</b>	<b>22</b>	<b>2</b>	<b>2</b>	<b>0</b>	<b>11</b>	<b>1</b>

Sixty-seven health claims were made in the articles reviewed for the three blogs. The number of health claims by blog corresponded to the number of articles reviewed from the blog. Therefore, Medical News Today had the greatest number of articles reviewed (n=18) and also the greatest number of health claims (n=29). Similarly, the number of health claims made for articles on specific intermittent fasting types corresponded to the number of articles reviewed for each fasting type. The 16/8 intermittent fast had 29 health claims in the 17 articles reviewed, the 5:2 diet had 20 health claims in the 11 articles reviewed, and the alternate day fasting diet had 18 health claims in the 10 articles reviewed. (Table 7)

Table 7. Summary of Total Number of Unique Health Claims Made in each Blog Source*			
	16/8 intermittent fast	5:2 Diet	Alternate day fasting
Blog Name	number of unique health claims		
Medical News Today	16	12	7
Simple Life	8	4	7
Harvard Health Blog	5	4	4
<b>Total</b>	<b>29</b>	<b>20</b>	<b>18</b>
* All of the health claims were associated with peer-reviewed references.			

A summary of each unique health claim that was made for each intermittent fasting method in all three blog sources is presented in Table 8.

Table 8. Summary of Unique health claims made for each fasting type according to blog source			
Blog name	Fasting type	Unique Health Claims	
Medical News Today	16/8 intermittent fast	<ul style="list-style-type: none"> <li>• Increased weight loss</li> <li>• Decrease in fat mass</li> <li>• Reduced risk of Type 2 diabetes</li> <li>• Reduce blood pressure</li> <li>• Help animals live longer</li> <li>• Protection from obesity</li> <li>• Protection from inflammation</li> <li>• Protection from diabetes</li> </ul>	<ul style="list-style-type: none"> <li>• Protection from liver diseases</li> <li>• Improved heart health</li> <li>• Slow down aging</li> <li>• Mitigate risk for breast cancer</li> <li>• Arrest tumor growth</li> <li>• Loss of visceral body fat</li> <li>• Extending life span</li> <li>• Protecting neuron function</li> </ul>
Medical News Today	5:2 diet	<ul style="list-style-type: none"> <li>• Lower risk of muscle loss</li> <li>• Higher fat loss</li> <li>• Prevent formation of gallstones</li> <li>• Reduction in fat tissue</li> <li>• Weight loss</li> <li>• Improving metabolic health</li> </ul>	<ul style="list-style-type: none"> <li>• Reduce fasting insulin levels</li> <li>• Reduce insulin resistance</li> <li>• Chronic disease prevention</li> <li>• Decrease in total cholesterol</li> <li>• Decrease in LDL cholesterol</li> <li>• Reboot immune system</li> </ul>
Medical News Today	Alternate day fasting	<ul style="list-style-type: none"> <li>• Weight loss</li> <li>• Heart health benefits</li> <li>• Reduced levels of inflammation</li> <li>• Longer life</li> </ul>	<ul style="list-style-type: none"> <li>• Slower tumor development</li> <li>• Slow signs of cognitive decline</li> <li>• Improves insulin sensitivity</li> </ul>
Simple Life	16/8 intermittent fast	<ul style="list-style-type: none"> <li>• Improve insulin sensitivity</li> <li>• Lower blood pressure</li> </ul>	<ul style="list-style-type: none"> <li>• Increase neuroplasticity</li> </ul>

		<ul style="list-style-type: none"> <li>• Reduce oxidative stress</li> <li>• Weight loss</li> </ul>	<ul style="list-style-type: none"> <li>• Reduce risk of insulin resistance</li> <li>• Reduce LDL cholesterol</li> <li>• Encourage cell turnover</li> </ul>
Simple Life	5:2 diet	<ul style="list-style-type: none"> <li>• Improve body image</li> <li>• Weight loss</li> </ul>	<ul style="list-style-type: none"> <li>• Protection against cardiotoxicity</li> <li>• Lower risk of cardiovascular disease</li> </ul>
Simple Life	Alternate day fasting	<ul style="list-style-type: none"> <li>• Reverse diabetes</li> <li>• Reverse reliance on insulin therapy</li> <li>• Reduce risk of Type 2 diabetes</li> </ul>	<ul style="list-style-type: none"> <li>• Reduce risk for heart disease</li> <li>• Improve insulin sensitivity</li> <li>• Decrease fasting glucose</li> <li>• Counteract age-related disorders</li> </ul>
Harvard Health	16/8 intermittent fast	<ul style="list-style-type: none"> <li>• Weight loss</li> <li>• Changes in fat mass</li> <li>• Changes in lean mass</li> </ul>	<ul style="list-style-type: none"> <li>• Changes in fasting insulin</li> <li>• Improved metabolic health</li> </ul>
Harvard Health	5:2 diet	<ul style="list-style-type: none"> <li>• Lower blood pressure</li> <li>• Improved insulin sensitivity</li> </ul>	<ul style="list-style-type: none"> <li>• Lower insulin levels</li> <li>• Weight loss</li> </ul>
Harvard Health	Alternate day fasting	<ul style="list-style-type: none"> <li>• Promote cellular repair</li> <li>• Improve insulin sensitivity</li> </ul>	<ul style="list-style-type: none"> <li>• Increase levels of Human Growth Hormone</li> <li>• Promote longevity</li> </ul>

## Discussion

Five personal trainers that work in in a local gym called the Edge Fitness Club in Jeffrey's Bay, South Africa were interviewed to determine what sources of information they use to educate themselves on health in general, and intermittent fasting specifically with a focus on blog sources. The top three blog sources were determined based on frequency of mention and select articles from each blog were analyzed for information accuracy using manual deductive qualitative coding in two criteria: timing of feed/fast, and instructions on caloric intake. Articles on the blog source were then rated for reliability based on accuracy of the two criteria and the use of peer-reviewed publications within the article. An average reliability score for the blog was calculated. Health benefit claims made in articles from each blog source were recorded and the cited references used to substantiate each claim were evaluated based on a hierarchy of scientific evidence.

The study found that these personal trainers used many of the same information resources reported in other studies on knowledge translation of personal trainers, including colleagues, textbooks, and mass media.<sup>52</sup> Particular to these trainers was the use and reliance on social media platforms like Tik Tok, Instagram, and YouTube. Blogs and co-workers are significant sources of information these trainers use to gather information about health and fitness topics as well as intermittent fasting.

This specific population of personal trainers indicated that they make it a priority to use accurate and reliable information sources for education, so that they can trust the information coming from those sources. It was important for them to feel confident that their knowledge on

a topic was coming from reliable information sources, so accurate information can be passed on to their clients enabling a mutually beneficial and trusting relationship.<sup>54</sup>

There are several methods for evaluating the credibility of a website or online information resources. Key areas to assess include currency, reliability, authority, and objectivity.<sup>46,47,49,50</sup> A select sample of blog articles from the most common blog sites used by personal trainers in this project showed that the articles from all three sites were relatively recent with the oldest article dating back to July 27th, 2015 and the most recent article written in April 6<sup>th</sup>, 2021. Results from the analysis of thirty-eight articles from the three most common blogs used by these trainers indicated that these blog sources are providing generally accurate information. Content accuracy was above 85% for timing of feed/fast and above 88% for instructions on caloric intake. On average, 90% of the articles across the three blogs used at least 1 peer-reviewed publication to substantiate the information. Medical News Today and Harvard Health consistently cited peer reviewed publications in all of their articles, whereas Simple Life cited peer reviewed publications less often. These results show the reliability of information in the articles on intermittent fasting from the blogs being used most commonly for education by the trainers in Edge Fitness.

Authors from all three blogs had appropriate credentials for the content. The authors of articles from Medical News Today and Simple Life were registered dietitians, exercise physiologists, writers who specialize in physical and mental health, and experienced health and wellness writers. There was only one author listed for articles coming from Harvard Health. That author is a practicing physician at Massachusetts General Hospital and a clinical instructor at Harvard Medical School.

The information provided in articles on intermittent fasting for all three blogs was well referenced and objective. All of the health claims made about intermittent fasting were accompanied by citations. Results showed that forty three percent of cited references that were used to back up health benefit claims from all blog sources were either Meta analyses and systematic reviews or randomized controlled trials, which are the top two tiers of the hierarchy of scientific evidence.<sup>1</sup> The authors of these blog articles used peer-reviewed journals, many in the higher levels of the hierarchy of scientific evidence. The 3 most frequently used blog sites by trainers at the gym evaluated indicate there is a high likelihood they are providing updated accurate information about intermittent fasting to their clients.

Blog sources are being utilized more as sources of information about health by professionals and the public alike.<sup>8</sup> Intermittent fasting is a very popular eating pattern that has gained public attention. It is becoming more normal for personal trainers and health professionals trying to gain knowledge about any health and fitness topic to turn to blogs as one source of health information.<sup>39</sup> It is beneficial to focus on where personal trainers get their health information because personal trainers help overweight and obese individuals lose weight and make positive changes in their lives. The appropriateness of the intermittent fasting eating pattern implemented by a client and the resulting outcomes depends on the accuracy of the information a personal trainer accessed to inform themselves.

The results from this project indicate that the blog sources these personal trainers used to educate themselves on intermittent fasting provide accurate information about the timing and caloric guidelines for the three most common intermittent fasting techniques. This evaluation is

specific to information about the three intermittent fasting diet patterns. Further research needs to be conducted to include analysis of more blog articles for Medical News Today, Simple Life, Harvard Health, and other blog sources in order to get a global perspective on what the information accuracy and reliability of the blogs as a whole are regarding intermittent fasting. Learning accurate health information from reliable sources is essential for individuals to make good decisions and help make a positive and meaningful impact in the lives of others. This project determined the accuracy and reliability of the three most common blog sources used by personal trainers in South Africa to educate themselves on intermittent fasting and provides a potential model for use in larger studies. Knowing the relative reliability of blog sources will help personal trainers educate themselves with accurate information about intermittent fasting, which will positively change the lives of clients in a significant way.

## Limitations

The small sample size of personal trainers, the number of articles reviewed for each blog, and limitations in the composite score used to assess blog site reliability are limitations of this study. Using a small convenience sample limited the generalizability of the project findings, because it was not representative of the entire population of personal trainers in South Africa. The close relationship of the five personal trainers used for this project may have influenced the types of blog and other information sources being used, which may have not been representative of the broader personal trainer community. Having said that, the project provides a foundation of information that can be built upon in future studies.

The blog articles reviewed were limited to those which contained information on both evaluation criteria, timing of feeding/fasting and caloric intake instruction. This limited the total number of articles about intermittent fasting that were reviewed. This was particularly true for the Harvard Health blog. A review of more articles from each blog would provide a more accurate evaluation of the overall blog reliability.

The method used for assessing reliability was based on accuracy of information regarding two key criteria about intermittent fasting and the use of peer-reviewed references in the blog articles. A composite score based on the criteria was calculated. The validity of this composite score has not been tested, so conclusions about the reliability of the blogs are cursory. Future research evaluating the validity of the proposed reliability score used is recommended.

## Recommendations

Future research should include a larger population of personal trainers to gather information regarding the sources of information used to educate themselves on intermittent fasting. The data will be more representative of the personal trainer population as a whole and the results more generalizable. It is also recommended that a simple survey be used as opposed to an interview approach to make it easier to gather information and to help increase the sample size of personal trainers. More articles should be analyzed for content accuracy on intermittent fasting in each blog source, so the data can be more representative of the blog source altogether. Finally, a modified assessment tool should be developed that will allow personal trainers to evaluate blog sites for accuracy and credibility pertaining to both intermittent fasting and any health and fitness topic.

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## Appendices

### Appendix A: Interview Guide

#### Introduction

Hello! My name is Shene Disbergen and I am in the process of completing a Master's Degree in Agriculture and Life Science at Virginia Tech. My final project is about intermittent fasting. Intermittent fasting has become a popular approach to weight loss, and there is a lot of information about it online and in social media. Because people often seek advice from personal trainers, I am interested to learn what information sources trainers use to learn about how to apply intermittent fasting for weight loss. As a personal trainer, I would love to ask you a few questions about intermittent fasting and where you get information about how to apply it. If you are willing to speak with me, can I please have your phone number and phone you when you have some free time to answer a few questions? I would greatly appreciate your cooperation, thank you.

#### Questions:

1. Do you have a go to source of information that you count on for accurate information to educate yourself on any health and fitness topic? (What are those sources? Anything else?)
2. Why do you like using each of those sources to gather information?
3. What sources of information have you used to educate yourself on intermittent fasting?
4. Have you used any blog sources to educate yourself on the topic of intermittent fasting?
  - Why do you use that/those blog source(s)?
  - Are there other blogs that you use as well or just that one?

I plan on using this information I gathered from our interview over the phone to figure out the top three blog sources you and your co-workers use to educate yourself on intermittent fasting. I am then going to analyze each blog source and determine if the blog source as a whole is accurate. Thank you for answering my questions.

## Appendix B: Perma Links

Ref ID	Blog Name	Article Title	Article Author	Date of Publication	Date of Download	<a href="#">Perma.cc Link</a>
_001	Medical News Today	A Guide to 16:8 Intermittent Fasting	Natalie Olsen	January 17th, 2020	August 26th, 2021	<a href="https://perma.cc/VT9W-2Q92">https://perma.cc/VT9W-2Q92</a>
_002	Medical News Today	16:8 fasting diet actually works, study finds	Ana Sandoiu	June 20th, 2018	August 26th, 2021	<a href="https://perma.cc/E3N2-9K2V">https://perma.cc/E3N2-9K2V</a>
_003	Medical News Today	Seven Ways to do Intermittent Fasting	Jayne Leonard	April 16th, 2020	August 26th, 2021	<a href="https://perma.cc/UM2W-5DMF">https://perma.cc/UM2W-5DMF</a>
_004	Medical News Today	Can you work out while doing an intermittent fast?	Miho Hatanaka	June 11th, 2020	August 26th, 2021	<a href="https://perma.cc/XK22-P6D9">https://perma.cc/XK22-P6D9</a>
_005	Medical News Today	Is time-restricted eating effective for weight loss?	Natalie Butler	July 4th, 2018	August 26th, 2021	<a href="https://perma.cc/F8FL-GYNS">https://perma.cc/F8FL-GYNS</a>
_006	Medical News Today	Pilot study of time-restricted eating suggests further research warranted	Timothy Huzar	February 6th, 2021	August 26th, 2021	<a href="https://perma.cc/KP4U-LQ4M">https://perma.cc/KP4U-LQ4M</a>
_007	Medical News Today	Time-restricted eating may prevent tumor growth	Maria Cohut	March 26th, 2019	August 28th, 2021	<a href="https://perma.cc/WM8R-CQ6H">https://perma.cc/WM8R-CQ6H</a>
_008	Medical News Today	How to Begin Intermittent Fasting	Natalie Butler	April 4th, 2019	August 28th, 2021	<a href="https://perma.cc/XRW5-GWLF">https://perma.cc/XRW5-GWLF</a>
_009	Medical News Today	What to know about the 500-calorie diet	Natalie Butler	June 22nd, 2018	August 26th, 2021	<a href="https://perma.cc/46NZ-WQYD">https://perma.cc/46NZ-WQYD</a>
_010	Medical News Today	How to do the 5:2 diet	Katherine Marengo	January 28, 2019	August 27th, 2021	<a href="https://perma.cc/RA2Z-RW2E">https://perma.cc/RA2Z-RW2E</a>
_011	Medical News Today	What are the best foods to break a fast with?	Louisa Richards	April 6th, 2021	August 29th, 2021	<a href="https://perma.cc/N28F-BB8C">https://perma.cc/N28F-BB8C</a>
_012	Medical News Today	How to naturally lose weight fast	Tracey Williams Strudwick	July 3rd, 2018	August 29th, 2021	<a href="https://perma.cc/RT24-QT3R">https://perma.cc/RT24-QT3R</a>

_013	Medical News Today	Behind the Counter: Intermittent fasting for type 2 diabetes	Kelly Wood	March 2nd, 2021	August 29th, 2021	<a href="https://perma.cc/TWQ8-BV46">https://perma.cc/TWQ8-BV46</a>
_014	Medical News Today	Fasting: Health benefits and risks	Honor Whiteman	July 27th, 2015	August 29th, 2021	<a href="https://perma.cc/QKF3-JDFV">https://perma.cc/QKF3-JDFV</a>
_015	Medical News Today	What to know about alternate day fasting	Jon Johnson	February 26th, 2020	August 29th, 2021	<a href="https://perma.cc/8LGP-4JD3">https://perma.cc/8LGP-4JD3</a>
_016	Medical News Today	Alternate-day fasting has health benefits for healthy people	Monica Beyer	September 1st, 2019	August 29th, 2021	<a href="https://perma.cc/32C9-SJAJ">https://perma.cc/32C9-SJAJ</a>
_017	Medical News Today	What to know about low calorie meal plans	Louisa Richards	August 26th, 2020	August 30th, 2021	<a href="https://perma.cc/A7A9-N9PU">https://perma.cc/A7A9-N9PU</a>
_018	Medical News Today	The ultimate beginner's guide to intermittent fasting	Megan Metropulos	January 7th, 2020	August 30th, 2021	<a href="https://perma.cc/E9ZY-9J7C">https://perma.cc/E9ZY-9J7C</a>
_019	Simple Life	16:8 Intermittent Fasting Plan: Everything You Need to Know	Linda Endicott	February 11th, 2020	August 31st, 2021	<a href="https://perma.cc/H9K9-QF5J">https://perma.cc/H9K9-QF5J</a>
_020	Simple Life	Intermittent Fasting: Weight Loss Results	Grace Trumpfeller	January 22nd, 2020	August 31st, 2021	<a href="https://perma.cc/2URF-KA7T">https://perma.cc/2URF-KA7T</a>
_021	Simple Life	A Complete Guide to Intermittent Fasting and Health	Linda Endicott	February 28th, 2020	August 31st, 2021	<a href="https://perma.cc/7UKD-L98Q">https://perma.cc/7UKD-L98Q</a>
_022	Simple Life	Is Intermittent Fasting Good for Your Heart?	Grace Trumpfeller	January 15th, 2020	August 31st, 2021	<a href="https://perma.cc/U52S-2NRE">https://perma.cc/U52S-2NRE</a>
_023	Simple Life	16 Benefits of Intermittent Fasting	Grace Trumpfeller	February 25th, 2020	August 31st, 2021	<a href="https://perma.cc/RRY8-RNBU">https://perma.cc/RRY8-RNBU</a>
_024	Simple Life	Intermittent Fasting Weight Loss for Women	Sarah-Mai Conway	January 16th, 2020	August 31st, 2021	<a href="https://perma.cc/G6D9-VPXX">https://perma.cc/G6D9-VPXX</a>

_025	Simple Life	How to Do Intermittent Fasting for Weight Loss	Linda Endicott	January 17th, 2020	August 31st, 2021	<a href="https://perma.cc/ZS2P-BWUF">https://perma.cc/ZS2P-BWUF</a>
_026	Simple Life	What Is 5:2 Fasting? Find Out if It's Right for You	Linda Endicott	January 27th, 2020	August 31st, 2021	<a href="https://perma.cc/NG54-2DP3">https://perma.cc/NG54-2DP3</a>
_027	Simple Life	Alternate Day Fasting: Is It Right for You?	Grace Engels	February 7th, 2020	August 31st, 2021	<a href="https://perma.cc/BK4A-KNT7">https://perma.cc/BK4A-KNT7</a>
_028	Simple Life	The Simple Guide to Intermittent Fasting Plans	Sarah-Mai Conway	February 28th, 2020	August 31st, 2021	<a href="https://perma.cc/W25M-KCVH">https://perma.cc/W25M-KCVH</a>
_029	Simple Life	Intermittent Fasting and Blood Sugar	Sarah-Mai Conway	May 15th, 2020	August 31st, 2021	<a href="https://perma.cc/Z6FH-5FXD">https://perma.cc/Z6FH-5FXD</a>
_030	Simple Life	Ultimate Guide to Intermittent Fasting for Weight Loss	Linda Endicott	March 4th, 2020	August 31st, 2021	<a href="https://perma.cc/5P7D-AYBL">https://perma.cc/5P7D-AYBL</a>
_031	Simple Life	A Complete Guide to Intermittent Fasting	Sarah-Mai Conway	March 5th, 2020	August 31st, 2021	<a href="https://perma.cc/B4C7-373Z">https://perma.cc/B4C7-373Z</a>
_032	Harvard Health	Is intermittent fasting safe for older adults?	No Author	April 1st, 2020	September 3rd, 2021	<a href="https://perma.cc/4H9B-66CS">https://perma.cc/4H9B-66CS</a>
_033	Harvard Health	Go figure: A healthy eating approach helps people be healthy	Monique Tello	March 16th, 2020	September 3rd, 2021	<a href="https://perma.cc/Q9MP-E6RL">https://perma.cc/Q9MP-E6RL</a>
_034	Harvard Health	Intermittent fasting: Does a new study show downsides — or not?	Monique Tello	October 30th, 2020	September 3rd, 2021	<a href="https://perma.cc/MP9F-HSXL">https://perma.cc/MP9F-HSXL</a>
_035	Harvard Health	What's a healthy breakfast?	Monique Tello	September 13th, 2018	September 3rd, 2021	<a href="https://perma.cc/83GC-MRST">https://perma.cc/83GC-MRST</a>
_036	Harvard Health	Not so fast: Pros and cons of the newest diet trend	No Author	July 31st, 2019	September 3rd, 2021	<a href="https://perma.cc/9564-UX3R">https://perma.cc/9564-UX3R</a>

_037	Harvard Health	Time to try intermittent fasting?	No Author	July 1st, 2020	September 3rd, 2021	<a href="https://perma.cc/6HRL-3SN9">https://perma.cc/6HRL-3SN9</a>
_038	Harvard Health	4 intermittent fasting side effects to watch out for	No Author	December 4th, 2020	September 3rd, 2021	<a href="https://perma.cc/U62Q-VYNU">https://perma.cc/U62Q-VYNU</a>

## Appendix C: Data Summary

Ref ID	Blog name	Fasting type	Timing	Caloric Intake	Type of reference
_001	Medical News Today	16/8 intermittent fast	accurate	accurate	peer-reviewed
_002	Medical News Today	16/8 intermittent fast	accurate	accurate	peer-reviewed
_003	Medical News Today	16/8 intermittent fast	accurate	inaccurate	peer-reviewed
_004	Medical News Today	16/8 intermittent fast	accurate	accurate	peer-reviewed
_005	Medical News Today	16/8 intermittent fast	accurate	accurate	peer-reviewed
_006	Medical News Today	16/8 intermittent fast	accurate	accurate	peer-reviewed
_007	Medical News Today	16/8 intermittent fast	accurate	accurate	peer-reviewed
_008	Medical News Today	16/8 intermittent fast	accurate	accurate	peer-reviewed
_009	Medical News Today	5:2 diet	accurate	accurate	peer-reviewed
_010	Medical News Today	5:2 diet	accurate	accurate	peer-reviewed
_011	Medical News Today	5:2 diet	accurate	accurate	peer-reviewed
_012	Medical News Today	5:2 diet	accurate	accurate	peer-reviewed
_013	Medical News Today	5:2 diet	accurate	accurate	peer-reviewed
_014	Medical News Today	5:2 diet	accurate	accurate	peer-reviewed
_015	Medical News Today	alternate day fasting	accurate	accurate	peer-reviewed
_016	Medical News Today	alternate day fasting	inaccurate	inaccurate	peer-reviewed
_017	Medical News Today	alternate day fasting	accurate	accurate	peer-reviewed
_018	Medical News Today	alternate day fasting	accurate	accurate	peer-reviewed
_019	Simple Life	16/8 intermittent fast	accurate	accurate	peer-reviewed
_020	Simple Life	16/8 intermittent fast	accurate	accurate	peer-reviewed
_021	Simple Life	16/8 intermittent fast	inaccurate	inaccurate	NA

_022	Simple Life	16/8 intermittent fast	accurate	accurate	peer-reviewed
_023	Simple Life	16/8 intermittent fast	accurate	accurate	peer-reviewed
_024	Simple Life	5:2 diet	accurate	accurate	peer-reviewed
_025	Simple Life	5:2 diet	accurate	accurate	peer-reviewed
_026	Simple Life	5:2 diet	accurate	accurate	peer-reviewed
_027	Simple Life	alternate day fasting	accurate	accurate	peer-reviewed
_028	Simple Life	alternate day fasting	accurate	accurate	NA
_029	Simple Life	alternate day fasting	accurate	accurate	peer-reviewed
_030	Simple Life	alternate day fasting	accurate	accurate	NA
_031	Simple Life	alternate day fasting	accurate	accurate	NA
_032	Harvard Health	16/8 intermittent fast	accurate	accurate	peer-reviewed
_033	Harvard Health	16/8 intermittent fast	accurate	accurate	peer-reviewed
_034	Harvard Health	16/8 intermittent fast	accurate	accurate	peer-reviewed
_035	Harvard Health	16/8 intermittent fast	accurate	accurate	peer-reviewed
_036	Harvard Health	5:2 diet	accurate	accurate	peer-reviewed
_037	Harvard Health	5:2 diet	accurate	accurate	peer-reviewed
_038	Harvard Health	alternate day fasting	inaccurate	accurate	peer-reviewed