2022 RESEARCH SUMMARIES

LATEST RESEARCH ON HEALTH, FITNESS, NUTRITION, LIFESTYLE & SUPPLEMENTS

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Table of Contents

A diet that includes Coffee, Blueberries, Nuts, Cocoa & Green Tea may reduce age related Cognitive Decline.

(Rajaram et., al 2019)

☕ Coffee: Up to 2 cups of coffee daily reduced the risk of cognitive impairment

🫐 Blueberries: 150g blueberries per day for 90 days led to better memory assessments. You can also use the supplement version to the same effect if blueberry isn't accessible; 500 – 1,000 mg of blueberry anthocyanins, once a day

🥜 Nuts: Elderly & Middle-aged people who ate nuts more than 5 times per week had better cognitive markers

🍫 Cocoa: Short-term trials showed improvements. Long term trials had mixed results

🍵 Green Tea - Up to 500ml a day protected cognitive function

🧃 Fruit Juices - Citrus fruit juices, pomegranate juice, grape juice & cherry juice improved memory & cognitive function

Note: Lifestyle factors such as adequate sleep, rest and physical activity play a huge role in fighting against age related cognitive decline (ARCD)

Reference: Sujatha Rajaram, Julie Jones, Grace J Lee, Plant-Based Dietary Patterns, Plant Foods, and Age-Related Cognitive Decline, Advances in Nutrition, Volume 10, Issue Supplement_4, November 2019, Pages S422–S436

Increased exposure to Nature reduces Stress, brain activity in regions involved with Sadness and Negative Emotions.

(Shuda et al., 2020)

🌳 Cortisol (a stress hormone) levels were lower in people living in neighborhoods with more green spaces compared to the people living in neighborhoods with fewer green spaces.

💮 Stress decreased as the percentage of green spaces increased.

📉 Exposure to nature 30 mins per week reduced blood pressure in people with hypertension.

🧠 90 mins nature walk reduced brain activity in regions involved with sadness and negative emotions.

🏞 Even looking at a nature picture and listening to nature sound significantly reduced stress compared to looking at nonnatural pictures and listening to non nature sound.

🚶 Going for a walk in the morning or evening (or both) in nature is a great way to clear your mind, reduce stress, and get steps in/maintain a moderate daily activity level.

Reference:
Shuda Q, Bougoulias ME, Kass R. Effect of nature exposure on perceived and physiologic stress: A systematic review. Complement Ther Med. 2020 Sep

Lack of sleep Increases Hunger, makes you Crave Sweets & reduces Resting Metabolic Rate.

(Spaeth et al., 2020), (Tajiri et al., 2020), (Spaeth et al., 2015)

🥱 Lack of sleep is linked to increased calorie intake and obesity.

🍽 Spaeth et al., 2020 - Sleep restriction led to increased daily calorie intake by 527 Calories.

🍩 Tajiri et al.,2020 - Sleep restriction increased sweet taste preference & led to consuming more calories.
Note: Sleep Restriction can affect different people differently. Some ate less than usual.

😳 Spaeth et al., 2015 - Sleep restriction decreased morning energy expenditure. Sleep loss may lead to metabolic changes conserving energy.

🛌 So how much sleep do we need?
Strength Trainees/Athletes (who train hard) - 9 hours sleep per night.
Sedentary Individuals - 7.5-8 hours per night.

Note:
If you wake up feeling refreshed and energised after 7-8 hour sleep, there's no need to force yourself to sleep longer.

Reference:
Tajiri E, Yoshimura E, Hatamoto Y, Shiratsuchi H, Tanaka S, Shimoda S. Acute Sleep Curtailment Increases Sweet Taste Preference, Appetite and Food Intake in Healthy Young Adults: A Randomized Crossover Trial. Behav Sci (Basel). 2020 Feb

How much exercise is needed to offset the health risks of a Sedentary Lifestyle?

(Ekelund et al., 2020)

📎 The risk of death was higher in people with higher sedentary time (low physical activity) & lower moderate to vigorous activity (exercise).

Note: Physical Activity refers to all the daily life movement that isn't deliberate exercise.
Ex: walking, sweeping, fidgeting, washing dishes, gardening, playing with kids/pets etc.

🕺 People with higher physical activity & the lowest sedentary time had the lowest risk.

🪑 People with lower physical activity & relatively higher exercise activity (30-40 mins) per day had a lower risk than people with lower physical activity and lower exercise time but higher risk than higher physical activity and lower sedentary time.

🗝 Key Takeaways:
*The increased health risk comes from being sedentary/inactive (8.5-10.5 hours per day except sleeping time) can be partially reduced by exercising (moderate to vigorous) 30-40 mins per day.
*Being active throughout the day is still crucial for optimal health even if you train hard few times a week.

Reference:
Ekelund U, Tarp J, Fagerland MW, et al Joint associations of accelerometer-measured physical activity and sedentary time with all-cause mortality: a harmonised meta-analysis in more than 44 000 middle-aged and older individuals British Journal of Sports Medicine 2020;54:1499-1506.

Avocados have a unique nutrient and bioactive profile that appears to play an important role in reducing Oxidized LDL-C (Bad Cholesterol).

(Wang et al., 2019)

🥑 One medium avocado (135g) per day with a moderate fat, heart-healthy diet decreased oxidized LDL-C.

👪 Three groups, divided into,
Low Fat (24% Calories from fat).
Moderate Fat (34% Calories from fat) with one avocado.
Moderate Fat (34% Calories from fat); matched fatty acid profile of an avocado.

🤔The common question that arises with this type of studies is LDL lowering benefit purely due to its fatty acid profile, or is there something unique about avocado? LDL-C lowering effect of avocados doesn't seem to be purely due to its fatty acid profile since the other moderate-fat group that matched avocado fatty acid profile didn't produce the same effect. Avocados seem to have a unique nutrient and bioactive profile that appears to play an important role in reducing LDL oxidation.

Reference - Li Wang, Ling Tao, Lei Hao, Todd H Stanley, Kuan-Hsun Huang, Joshua D Lambert, Penny M Kris-Etherton, A Moderate-Fat Diet with One Avocado per Day Increases Plasma Antioxidants and Decreases the Oxidation of Small, Dense LDL in Adults with Overweight and Obesity: A Randomized Controlled Trial, The Journal of Nutrition, Volume 150, Issue 2, February 2020, Pages 276–284

What is the optimal time to take Caffeine before a workout?

(Harty et al., 2020)

 This study investigated the physical performance-enhancing effects of Caffeine between time points; 30 mins, 1 hour, and 2 hours before a workout with 6mg of Caffeine per kilogram of bodyweight.

 One hour before a workout showed the most consistent physical performance-enhancing effects compared to two other time points. These findings are consistent with the overall literature on Caffeine timing.

 Peak levels of Caffeine generally reach 30–60 minutes after ingestion. However, the optimal pre-workout timing could vary from 15mins - 2 hours, depending on intraindividual variability.

 I find, about 30 mins before the workout works for me the best. It's one of those things you have to experiment with different time points and figure out what works for you best.

Reference:
Harty PS, Zabriskie HA, Stecker RA, Currier BS, Tinsley GM, Surowiec K, Jagim AR, Richmond SR, Kerksick CM. Caffeine Timing Improves Lower-Body Muscular Performance: A Randomized Trial. Front Nutr. 2020 Nov 23;7:585900.

Regular Exercise increases motivation to maintain positive dietary changes.

(Castro et al., 2020)

🏋 All Strength Training, Endurance, Combination of Strength & Endurance, Unsupervised training similarly increased motivation towards maintaining positive dietary changes.

🍽 I have seen this many times with clients and myself; eating well and making better food choices when you train & diet goes out of the window when you take a break or stop training.

🧠 Exercise help build muscles, increases energy expenditure (burn calories) and makes it easier to lose weight and maintain it long-term. However, the psychological effect of making it easier to maintain positive dietary changes is a huge benefit that we don't usually talk about.

Reference:
Castro, E.A.; Carraça, E.V.; Cupeiro, R.; López-Plaza, B.; Teixeira, P.J.; González-Lamuño, D.; Peinado, A.B., on behalf of the PRONAF Study Group. The Effects of the Type of Exercise and Physical Activity on Eating Behavior and Body Composition in Overweight and Obese Subjects. Nutrients 2020, 12, 557. https://doi.org/10.3390/nu12020557

Five Servings of Fruits & Vegetables (two servings of fruits & three servings of vegetables) per day is Optimal for Long-term Health. Intakes higher than five servings a day didn't show additional benefits.

(Wang et al., 2021)

😇We all know Fruits and Vegetables are good for us. Vegetables dominate all other food categories when it comes to nutrient density per Calorie.

⚖️Standard serving size for Fruits & Vegetables is about 75g. So 150g fruits & 225g of vegetables per day is the optimal intake. However, a 2017 meta-analysis (Aune et al., 2017) found a further reduction in cardiovascular risk and all-cause mortality risk up to 800g (10 servings) per day.

🍽I usually aim for 400g-800g per day, depending on my Calorie intake and hunger level. If I'm dieting, I generally eat more vegetables, more food volume for fewer calories. Plus, you are more likely to miss optimal amounts of Fiber intake & Micronutrients when dieting. So increasing fruits & vegetables helps offset that.

🥬Freshly picked fruits and vegetables from the farm or your garden are the most nutritious. In supermarkets, both fresh and frozen are equally nutritious, or frozen may even be more nutritious in some cases. Generally, freezing can preserve nutritional value. Plus, frozen produce is often cheaper and saves time.

🌈Eat a variety of Vegetables & Fruits to ensure you get the best range of nutrients.

Reference:
Wang DD, Li Y, Bhupathiraju SN, Rosner BA, Sun Q, Giovannucci EL, Rimm EB, Manson JE, Willett WC, Stampfer MJ, Hu FB. Fruit and Vegetable Intake and Mortality: Results From 2 Prospective Cohort Studies of US Men and Women and a Meta-Analysis of 26 Cohort Studies. Circulation. 2021 Apr

Dagfinn Aune, Edward Giovannucci, Paolo Boffetta, Lars T Fadnes, NaNa Keum, Teresa Norat, Darren C Greenwood, Elio Riboli, Lars J

Vatten, Serena Tonstad, Fruit and vegetable intake and the risk of cardiovascular disease, total cancer and all-cause mortality—a systematic review and dose-response meta-analysis of prospective studies, International Journal of Epidemiology, Volume 46, Issue 3, June 2017

Going to bed late and waking up late (Evening Chronotype) is associated with increased health risks.

(Lotti et al., 20201)

🛌Chronotype refers to individual differences in sleep timing and wake up time preferences for a given time of day (Circadian Rhythm). Morning types prefer to get up and go to bed early, while evening types get up and go to bed later.

🔬This meta-analysis of 39 observational studies assessed energy intake, BMI, blood lipids, fasting blood glucose, blood pressure, and risk of chronic diseases.

☠️Compared to the morning chronotype, the evening chronotype was associated with increased blood glucose, LDL-C, triglyceride, type 2 diabetes & depression.

🍌Those who do jobs require staying awake overnight should pay more attention to nutrition and exercise. You probably be able to minimize the risks with proper nutrition and exercise. Consider supplementing Melatonin & Vitamin D.

Reference:
Lotti S, Pagliai G, Colombini B, Sofi F, Dinu M. Chronotype Differences in Energy Intake, Cardiometabolic Risk Parameters, Cancer and Depression: A Systematic Review with Meta-analysis of Observational Studies. Adv Nutr. 2021 Sep 21.

Does time restricted eating cause muscle loss?

(Chen et al., 2021)

🕘Time-Restricted Eating/Intermittent Fasting has been quite popular over the last few years, often marketed as a superior method for weight loss. Not many studies conducted in this area are Calorie controlled or examined the quality of the weight loss (Fat/Muscle Mass Ratio).

🔬This meta-analysis investigated impact of TRE on weight loss and metabolic health in overweight & obese people.

🔍Meta-analysis of 9 Studies lasted 4 weeks or more. Most studies had participants eating Ad libitum dieting with only difference restricted time window or no time restriction.

⚖️TRE resulted in 2.32% more weight loss compared to unrestricted. However, the fat loss in both interventions were similar. TRE resulted in greater LBM loss.

😌Practical Application

* • We can't say with 100% certainty TRE cause muscle loss because this study measured LBM loss not Muscle Mass. They are not perfectly corelated.
* • If they actually did lose muscle mass, adequate protein consumption and strength training can reduce muscle loss during dieting.
* • Extra weight loss in TRE could be purely due to less energy intake. When Calories and Protein equate there's no significant difference in weight loss between TRE & traditional way of eating.

Reference

Chen JH, Lu LW, Ge Q, Feng D, Yu J, Liu B, Zhang R, Zhang X, Ouyang C, Chen F. Missing puzzle pieces of time-restricted-eating (TRE) as a long-term weight-loss strategy in overweight and obese people? A systematic review and meta-analysis of randomized controlled trials. Crit Rev Food Sci Nutr. 2021 Sep

How many steps per day should you do for optimal health? (Burton et. al, 2021)

* Pedometer came to market in 1965 in Japan under the name “Manpo Kei” literally translated to “10,000 steps meter”
* 10,000 steps per day is not evidence based.

How Many Steps per Day is Optimal?

* Burton et. al, 2021 – Randomized crossover study. There are evidence low activity levels can blunt metabolic benefits from exercise aka Exercise resistance. Main objective of the study to investigate how many steps required to overcome exercise resistance.
Low group – average 2675 steps per day, Limited – 4759, Normal – 8481.
5000 isn’t enough – 8,000 steps enough. Between 5-8K is a good target to aim for health.

* Saint-Maurice et. al, 2020 – Observational Study. A greater number of daily steps was significantly associated with lower all-cause mortality. There was no significant association between step intensity and mortality after adjusting for total steps per day. Mortality risk consistently dropped till 12,000 Steps per day. There’s no significant difference between 12,000 & 16,000.

* Wang et al., 2008 - Maintaining high levels of daily physical activity during weight loss may be important to mitigate weight regain after weight loss.

Practical Application;
* 10,000 Steps per day is not a rule everyone must stick to.
* 5000-8000 Steps may be enough to overcome exercise resistance and get maximum metabolic benefits from exercise. Aim for higher end.
* Overweight & Obese individuals can benefit from higher step targets to lose excess weight quicker.
* Maintaining higher activity levels help prevent weight regain and maintain results long term.

Reference:

Burton HM, Coyle EF. Daily Step Count and Postprandial Fat Metabolism. Med Sci Sports Exerc. 2021 Feb

Saint-Maurice PF, Troiano RP, Bassett DR Jr, Graubard BI, Carlson SA, Shiroma EJ, Fulton JE, Matthews CE. Association of Daily Step Count and Step Intensity With Mortality Among US Adults. JAMA. 2020 Mar

Wang X, Lyles MF, You T, Berry MJ, Rejeski WJ, Nicklas BJ. Weight regain is related to decreases in physical activity during weight loss. Med Sci Sports Exerc. 2008 Oct

Do you find yourself falling off from eating healthy often? This might help you stay on track.
Helland et. al, (2021)

We all know exercise is good for you. But exercise by itself is not a great strategy for fat loss/weight loss. A combination of both diet & exercise seems to be the best way of maintaining long term healthy body weight long term and minimizing the risk of disease. Weight loss studies have high dropout rates, just like in real life because, let's face it, dieting is not the most amusing thing in the world.

Helland et. al, (2021) investigated nutritional guidance and physical activity on dietary habits & barriers and motivators for changes in diet and physical activity.
Study Structure
* Thirty-three weeks baseline, One year post-intervention.
* Two groups; Training & Nutrition Program & Training Only.
* Exercise only group was advised not to change their diet.

Findings/results
* Both groups increased consumption of fruits and vegetables.
* Both groups decrease consumption of refined grains, sugar sweetened beverages, junk food and snacks.
* So both groups made "BETTER" food choices despite being told not to change diet in exercise only group.
* They reported it was natural to establish a healthier diet after spending time on exercise.
* One participant stated, “When I’ve spent so much time on training, it seems foolish to return home to the sofa with a bag of crisps and a coke.”

Other interesting findings
* The most important motivator was improving health & general wellness.
* The biggest barriers to changing diet were work, family, and meal size.
* The biggest barriers to exercise were time constraints and holidays.

Practical Applications/What the results mean to us
* Often people stop exercising completely when life gets in the way, "Well, I don't have the time to exercise now, so I'm just going to eat well and wait till I have the time to train properly a few times per week."
* Realistically, how long were you able to stick to good eating habits

after completely stopping exercise? I guess not that long.
* Regular exercise influences healthier food choices.
* Don't stop training completely, hoping you will be able to eat healthy till things get better and have more time to exercise again. It doesn't work.
* Instead, you can reduce the training frequency, the time you spend on workouts. Get more efficient with workouts. Do home workouts if you don't have the time to go to the gym.
* Try to adopt and modify training and nutrition according to life situations rather than having one fixed way of doing things and stop when you can't execute everything to your definition of perfection.

Reference:
Helland MH, Nordbotten GL. Dietary Changes, Motivators, and Barriers Affecting Diet and Physical Activity among Overweight and Obese: A Mixed Methods Approach. Int J Environ Res Public Health. 2021 Oct

Fasted training may increase hunger, increase Calorie intake and decrease energy expenditure after training.

Frampton et al., (2022)

A lot of people do fasted exercise expecting a greater fat loss. However, in 2014, Schoenfeld et al., found no significant difference in fat loss with fasted training compared to exercising after a meal.

Frampton et al., (2022); a Meta-analysis of 23 studies investigated the acute effect of fasted exercise on energy intake, energy expenditure, subjective hunger, and gastrointestinal hormone (mainly hunger hormones) release compared to fed exercise.

Findings
-Subjective hunger was higher after fasted exercise even after having a post workout meal compared to fed exercise without post workout meal.
-Fed exercise with a standardized post-exercise meal resulted in the lowest energy intake at the ad libitum meal served following exercise completion.
-Fasted exercise without a standardized post-exercise meal resulted in the lowest within-lab and 24-h energy intake. But also produced the lowest energy expenditure and highest hunger.

Practical Applications/What the results mean to us
-The authors found a high risk of bias in measurements, so the data's validity is questionable.
-Just keep that in mind, if you feel hungry more than usual after fasted exercise, maybe don't do fasted training.
-Fasted Cardio doesn't seem to provide an advantage for fat loss compared to fed training.
-Fasted weight training is inferior to fed weight training.
-Overeating is more likely to happen when you are not aware of your energy intake.

Save this post for your future reference and share it in your stories so your friends & followers will also benefit from it 😊
Reference
Frampton J, Edinburgh RM, Ogden HB, Gonzalez JT, Chambers ES. The acute effect of fasted exercise on energy intake, energy expenditure, subjective hunger and gastrointestinal hormone release compared to fed exercise in healthy individuals: a systematic review and network meta-analysis. Int J Obes (Lond). 2022 Feb;46(2):255-268.

Can we burn more FAT in cold weather?
Soberg et al., (2021)

There are two types of Body Fat
1. White adipose tissue (WAT); more common
2. Brown adipose tissue (BAT)

BAT produce heat when exposed to cold. Put simply, BAT burns extra energy so we can stay warm. Repeated exposure to the cold is associated with increased BAT activity.

Soberg et al., (2021) assessed whether BAT activity differed between 8 winter swimmers and 8 controls exposed to both cold and warm temperatures. The secondary outcomes were energy expenditure, gene expression in WAT, and skin and core body temperature

Findings
Both groups had similar BAT activity in cold period.
Only controlled group showed clear BAT activity in warm period.
-No difference in REE between two groups during warm period.
-Winter swimmers had higher Resting Energy Expenditure in cold period.
-Winter swimmers burned extra 20 Calories in cold period and control group only burned extra 9 Calories (18 Calories per hour) compared to warm period.

Practical application
According to this study, you only burn extra 18 Calories per hour with exposure to cold weather. You can burn way more Calories than that simply by engaging in moderate activities.
In previous studies brown fat on energy expenditure in cold temperature ranged from 25-400 Calories per day.
Obese individuals have lower BAT activity. In other words, people who need it the most have the least effect.
At this stage we don't know how to activate BAT, there's no real point focusing on that.

Fun Facts about BAT
BAT is detectable in Infants & Children and total BAT decline throughout life.
An average person has around 0-600g of BAT.
BAT is present in the neck, along the spine, and in the supraclavicular

area (where it is most active).

Reference:
Søberg S, Löfgren J, Philipsen FE, Jensen M, Hansen AE, Ahrens E, Nystrup KB, Nielsen RD, Sølling C, Wedell-Neergaard AS, Berntsen M, Loft A, Kjær A, Gerhart-Hines Z, Johannesen HH, Pedersen BK, Karstoft K, Scheele C. Altered brown fat thermoregulation and enhanced cold-induced thermogenesis in young, healthy, winter-swimming men. Cell Rep Med. 2021 Oct 11

How technology can help you lose weight & behavior change.

(Berry et al., 2021)

🥗 Changing eating behavior and increasing physical activity is not easy. What if technology like apps & tracking devices can help?

👩‍🔬 Berry et al., 2021 a meta-analysis of 12 studies, examined how digitally self-monitoring diet and physical activity influence weight loss and behavior.

🕵️ Findings:
Self-monitoring participants achieved higher physical activity and ate 180 Calories less than the no self-monitoring participants, leading to 3kgs additional weight loss. Self-monitoring also helped change eating habits. These effects were more significant when coupled with a personalized program.

📱 A few of my favorite tracking apps & devices:
Bodyweight - Most phones have an inbuilt health app, Excel sheet
Physical Activity/Steps - Any wearable activity tracker, smartwatch
Calories & Macros - Cronometer, My fitness pal, Control My Weight by Calorie King

✍️ Take home message:
Track both inputs and outcomes and keep records. You don't have to track all the time. You can reduce tracking frequency as you get more experienced with tracking. It's good to track from time to time, even if you are someone who is experienced.

Does meal frequency make a significant difference in fat loss?

(Grangeiro et al., 2021)

🔨The latest study on meal frequency by Grangeiro et al., 2021 put another nail in the coffin.

🚶For a long period, small frequent meals were the staple of a fat loss diet. Some early observational studies have reported lower meal frequency associated with increased body weight, and small regular meals are superior for fat loss.

🐵Grangeiro et al., 2021 examined 40 obese women over 12 weeks. Both the six meals group and three meals group had similar energy deficit and macronutrient distribution.

🦁Participants showed no difference in body weight loss, body composition, blood lipids, or markers of insulin sensitivity between six small frequent meals and three bigger meals.

Reference:
Grangeiro ÉD, Trigueiro MS, Siais LO, Paiva HM, Sola-Penna M, Alves MR, Rosado EL. Hypocaloric diet with lower meal frequency did not affect weight loss, body composition and insulin responsiveness, but improved lipid profile: a randomized clinical trial. Food Funct. 2021 Dec 13;12(24):12594-12605.

Physical performance peaks in the late afternoon and early evening.

(Knaier et al., 2022)

⏰ There's always the question, "is there a best time to work out?" If you can target a specific time that increases your performance, you can train harder in the gym and perform better in sports.

🗣️ Most world records in sports are broken in the early evening (IMO, this doesn't say much since most sporting events are scheduled in the early evening due to television demands). But it's also the time that the body temperature & alertness tend to be highest (hiddinga et al., 1997, Dijk et., al 1992).

👨‍🔬 Knaier et al., 2022, a systematic review and meta-analysis of 63 RCTs, investigated variations in maximum endurance and strength performance at different times of the day.

💡 There was no significant difference in endurance type of exercise between different times of the day. In contrast, peak performance in strength and power type of training occurred between 1pm and 9pm.

👓 Take-home points:
-Should I schedule my workouts in the afternoon and early evening? If it fits your schedule, why not.
-There are a few factors that can influence the timing of peak performance, including at what time you usually exercise and circadian rhythm. If you consistently train in the morning, you will be able to close the performance gap.
- I usually like to train in the morning and get my workout out of the way. It's better to get the workout done rather than trying to optimize the timing and miss the workout.

Reference:
Knaier R, Qian J, Roth R, Infanger D, Notter T, Wang W, Cajochen C, Scheer FAJL. Diurnal Variation in Maximum Endurance and Maximum Strength Performance: A Systematic Review and Meta-analysis. Med Sci Sports Exerc. 2022 Jan

Doing cardio before weight training (in the same session) negatively affects strength.

(Markov et al., 2021)

Strength training and endurance training produce opposing adaptations to a degree.
Markov et al., 2021, a meta-analysis of 15 trials, examined the acute effects of aerobic exercise on muscle strength.
Overall, aerobic training caused a moderate decline in muscle strength.
Aerobic exercise over 30-minute with moderate-high intensity before strength training had a more significant effect.

Practical application

- If feasible and time is not an issue, do cardio and strength training in two separate sessions. Ideally, keep them away from each other for at least 6 hours.
- Low-intensity cardio like walking probably won't affect strength negatively to a larger degree.
- If you have to do cardio and strength training in the same session, do cardio after the weight training session and keep the cardio to low intensity.
- If you are doing moderate-high intensity aerobic training in the same sessions as weight training, keep aerobic training under 30 mins.

Reference:
Markov A, Chaabene H, Hauser L, Behm S, Bloch W, Puta C, Granacher U. Acute Effects of Aerobic Exercise on Muscle Strength and Power in Trained Male Individuals: A Systematic Review with Meta-analysis. Sports Med. 2021 Dec 8

Exposure to bright light at night reduces melatonin production by 63% and reduces fat oxidation (during bright light exposure & sleep).

(Choi et al., 2022)

👨🏽‍💻 Our lives continue to get busier, and we work longer hours than ever. Chronic exposure to artificial light at night has been associated with higher body weight and a higher risk of obesity.

💡 Choi et al., 2022, a randomized controlled crossover trial investigated the effect of exposure to light at night on energy metabolism. Two groups were assigned in random order to bright light (10,000 lux), or dim light (<50 lux) between 9.00 pm to 12.00 am. Later crossed over to the other condition after at least seven days. They slept in a metabolic chamber between 12 to 7 am.

💤 Melatonin level was 63% lower in people exposed to bright light than dim light. The bright light group also experienced a decrease in fat oxidation (during light exposure and sleep) and an increase in carbohydrate oxidation during sleep.

This raises the question, does exposure to bright light later at night disrupt circadian rhythm and leading to changes in metabolism.

👨🏻‍⚕️ Authors' conclusion - chronic bright light exposure at night may lead to obesity risk due to disturbances in circadian rhythms and macronutrient metabolism.

Reference:
Choi Y, Nakamura Y, Akazawa N, Park I, Kwak HB, Tokuyama K, Maeda S. Effects of nocturnal light exposure on circadian rhythm and energy metabolism in healthy adults: A randomized crossover trial. Chronobiol Int. 2022 Apr

Sleeping more leads to eating fewer daily Calories and increase fat loss

(Tasali et al., 2022)

😴🍗🍰🤰

🤯Observational studies show an association between short sleep duration and increased risk of obesity. Each hour of reduction in sleep compared to 7 hours of sleep increased obesity risk by 9% (Zhou et al., 2019).

🧐There are a few potential reasons/explanations for this association

- Short sleep duration may stimulate hunger through effects on appetite-regulating hormones.
- Reduced sleep enhances the neuronal centers in the brain associated with pleasure and reward, leading to eating more energy dense food (Onge et al., 2019), (Greer et al., 2013).
- Increased time awake, more time to eat.

👨‍⚕️ Tasali et al., 2022 a randomized controlled trial investigated if increasing sleep duration in a real-life setting reduces energy intake.

😴Participants with 6.5 hours or less habitual sleep were randomized into one of two groups.

1. Sleep extension – Increased sleep duration to 8.5 hours
2. Control Group – Continued with usual sleeping habits of 6.5 hours.

🚶 Participants were advised to continue with their regular daily routine without a prescribed diet or physical activity. So, they are unlikely to influence the outcome.

🕵️Interestingly, when sleep duration increased from 6.5 hours to 8.5 hours, they consumed 156 less Calories per day. The controlled group consumed 115 Calories more per day. So the participants slept 8.5 hours ate 270 Calories less than the participants who slept only 6.5 hours. Sleep duration was inversely correlated with the change in energy intake. Every hour increased in sleep duration is associated with a reduction in 162 Calorie consumption approximately.

☑ Improving and maintaining a healthy sleep duration should be considered as a part of a fat loss, body composition, or lifestyle program.

Reference:

Tasali E, Wroblewski K, Kahn E, Kilkus J, Schoeller DA. Effect of Sleep Extension on Objectively Assessed Energy Intake Among Adults With Overweight in Real-life Settings: A Randomized Clinical Trial. JAMA Intern Med. 2022 Apr

Training a muscle group TWO times per week and FOUR times per week has a similar effect on muscle growth and strength when weekly training volume is identical.

(Hamarsland et al., 2022)

🔥🏋️‍♀️💪🏽🗓️

🏋️‍♀️There are three key variables we can manipulate in strength program design to optimize the results; Intensity (Load), Volume, and frequency. And there are many different ways you can use these variables in programming.

👨🏻‍💼Hamarsland et al., 2022, a randomized controlled trial compared the effects of volume-equated training frequency on muscle mass and strength gains.

Twenty-one moderately participants were assigned into one of two groups.

1. Low-frequency group – 2 times per week
2. High-frequency group – 4 times per week

*Training Intensity and total sets per muscle group per week were identical.

💡Both groups improved 1RM for the barbell back squat, hack squat, barbell bench press, and machine chest press, with no differences between groups. Similarly, total lean mass, lean leg mass, lean trunk mass, lean arm mass, and vastus lateralis thickness improved in both groups, with no differences between groups.

Reference:

Hamarsland H, Moen H, Skaar OJ, Jorang PW, Rødahl HS and Rønnestad BR (2022) Equal-Volume Strength Training With Different Training Frequencies Induces Similar Muscle Hypertrophy and Strength Improvement in Trained Participants.

Walk more and live longer. Increasing daily steps can significantly reduce all-cause mortality risk, the risk of cardiovascular disease (CVD), and type 2 diabetes (T2D), which are two of the most prevalent and deadly diseases worldwide.

(Jayedi et al., 2022)

🔥 Walking or Steps is a significant portion of Non-Exercise Activity Thermogenic (NEAT). Having higher NEAT help lose body fat and maintain healthy BMI and body weight long term.

🔍 Jayedi et al., 2022, a meta-analysis of seven prospective cohort studies investigated the association between daily step count and all-cause mortality risk in 28,141 participants.

📈 16,000 Steps per day were associated with 66% lower risk in all-cause mortality compared to 2700 steps per day.

🚶 Health Benefits of Walking

- Increase energy expenditure and help maintain healthy body weight and BMI
- Reduce blood pressure
- Improve blood glucose control
- Enhance cognition
- Improve mood
- Walk-in nature (green areas) has shown to reduce stress

👨‍💻 Realistically it's challenging to achieve higher step counts like 16K or even 10K in some cases for busy people who have busy jobs and a family. However, I use various strategies to accumulate steps throughout the day with my clients. Combining a few simple strategies and planning, most people can achieve over 10,000 steps per day without spending too much extra time.

🥳 16,000 or even 10,000 steps a day might be a big stretch if your current activity level is low. But the good news is every bit counts. Additional 2000 steps from any baseline were associated with a 5% decrease in the risk of developing type 2 diabetes. Each 500-1000 increment was associated with 5-21% lower risk of Cardio Vascular Disease.

📖Note: Since this is a meta-analysis of prospective cohort studies, the results were likely affected by confounding variables. So we Cannot establish causation.

Reference:
Jayedi A, Gohari A, Shab-Bidar S. Daily Step Count and All-Cause Mortality: A Dose-Response Meta-analysis of Prospective Cohort Studies. Sports Med. 2022 Jan

Plants that Improve Cognition

(Lorca et al., 2022)

Ginkgo
Bacopa
Ashwagandha
Caffeine
Flavonoids

🧠According to the latest Diagnostic and Statistical Manual of Mental Disorders, human cognition can be divided into six domains; perceptual-motor function, language, learning and memory, social cognition, complex attention, and executive function.

🩺Traditional Chinese and Ayurvedic medicine use various plant-derived nootropics (PDN) to enhance cognitive performance.

👩🏻‍⚕️Lorca et al., 2022, a systematic review of 256 human trials and systematic reviews investigated which PDNs are supported by scientific studies conducted in humans and for what specific domains of cognition?

😇Summary of Benefits
Ginkgo - perceptual-motor function improvement, improved attention
Bacopa - language, learning and memory improvements, improved attention
Ashwagandha - improving social cognition (i.e., anxiety and stress), improved attention
Caffeine - attention and executive functions
Flavonoids - executive function

Reference:
Lorca C, Mulet M, Arévalo-Caro C, Sanchez MÁ, Perez A, Perrino M, Bach-Faig A, Aguilar-Martínez A, Vilella E, Gallart-Palau X, Serra A. Plant-derived nootropics and human cognition: A systematic review. Crit Rev Food Sci Nutr. 2022 Jan

Comparing physical appearance to images of Instagram models with "slim-thick" (large butt and thighs and small waist and flat stomach) bodies negatively affect young women's body image.

(McComb et al., 2022)

👸 Being thin, with a flat stomach and small waist (thin ideal) has been the benchmark for ideal female beauty in mainstream media until recent years. But recently, "fit ideal" (being thin but with greater muscularity than the thin ideal) and the "slim-thick ideal"(being thin, with a small waist and flat stomach but with a larger butt and thighs than the thin ideal) have gained more popularity in mainstream media and social media.

📝This study examined the impact of forced social comparison to slim-thick-, thin-, and fit-ideal imagery on women's body image relative to a control condition and whether physical appearance perfectionism moderated these findings.

💃The authors collected data from 402 young female undergraduate psychology students (ages 18–25) who viewed 13 Instagram images. The images used in the study were derived from public Instagram accounts of young women who had less than 60,000 followers (so that the models would likely be unknown to the participants). "Likes" and comments were not visible to the participants. [SEP]
😔Overall, all three body ideal types (thin, fit, slim thick) provoked appearance dissatisfaction and less body satisfaction.

🍑The researchers found that the slim-thick ideal had a negative effect on the participants' body image. It was also associated with more dissatisfaction and lower body satisfaction than "thin ideal" condition.

Reference:
McComb SE, Mills JS. The effect of physical appearance perfectionism and social comparison to thin-, slim-thick-, and fit-ideal Instagram imagery on young women's body image. Body Image. 2022 Mar;40:165-

175. doi: 10.1016/j.bodyim.2021.12.003. Epub 2021 Dec 27. PMID: 34968854.

Excessive drinking leads to unhealthier aging. Occasional drinking doesn't seem to have detrimental effects.

(Ortolá et al., 2022)

🛋️🍗👴🏻👺

🍻High levels of alcohol consumption are known to have detrimental effects on health. Although some studies have shown that drinking low levels of alcohol can reduce mortality, these findings have been questioned due to methodological limitations. A recent meta-analysis found that even a low level of alcohol consumption is associated with an increased risk of cancer and other diseases.

🌐 Ortolá et al., 2022 a prospective cohort study investigated whether lifetime alcohol consumption is associated with unhealthy aging.

🍹 Researchers assessed mental health, self-reported vitality, morbidities (incidence of diseases), and functional impairments (physical and cognitive) against the frequency of lifetime alcohol consumption (low, medium, or high) in participants.

👴🏻 Medium and high-frequency alcohol consumption was associated with unhealthier aging (especially incidences of disease and functional impairment). Occasional alcohol consumption did not show a strong association with unhealthier again.

Reference:
Ortolá R, García-Esquinas E, Carballo-Casla A, Sotos-Prieto M, Banegas JR, Rodríguez-Artalejo F. Alcohol consumption patterns and unhealthy aging among older lifetime drinkers from Spain. Drug Alcohol Depend. 2022 Jun 1;235:109444. doi: 10.1016/j.drugalcdep.2022.109444. Epub 2022 Apr 7. PMID: 35421688.

Air pollution leads to poor cognitive performance.

(Sakhvidi et al., 2022)

🚕 🧆 🧠 ⬇️

🧆Air pollution is a risk factor for cognitive decline and dementia. It accounts for about 2% of all dementia cases.

🌆Sakhvidi et al., 2022, a cross-sectional study of 61,462 French metropolitan adults (average age of 58), examined whether exposure to outdoor air pollution is associated with lower cognitive performance.

🧠Exposure to even a low level of general air pollution was correlated with decreased language skills and executive function.

🚙Nitrogen dioxide and black carbon had more severe effects than general air pollution.

🤷‍♀️ Women were more affected than men by air pollution in all aspects of cognition except language skills. Researchers didn't have an explanation for this finding.

Note:
This is a cross-sectional study. This does not establish causation. However, since it's extremely difficult (nearly impossible) to conduct a RCT to assess this association, this study provides valuable information.

Reference:
Zare Sakhvidi MJ, Yang J, Lequy E, Chen J, de Hoogh K, Letellier N, Mortamais M, Ozguler A, Vienneau D, Zins M, Goldberg M, Berr C, Jacquemin B. Outdoor air pollution exposure and cognitive performance: findings from the enrolment phase of the CONSTANCES cohort. Lancet Planet Health. 2022 Mar

Unhealthy lifestyle behaviors such as smoking, alcohol consumption, lack of physical activity and sleep, high average sitting time, and poor dietary habits negatively impact mental health.

(George et al., 2022)

🚬🧠🌭🥺

😓People with psychological disorders such as depression and anxiety are often treated with medication or psychotherapy. Although these treatments can be very effective for some people, some individuals don't show improvements after treatment.

🧬George et al., 2022 a cross-sectional and prospective cohort study, analyzed data from 267,153 Australian adults ages 45 and older (average age of 61) to look for an association between psychological distress and unhealthy lifestyle behaviors.

🧍 The participants were given a score based on their unhealthy behavior, which included eight categories (physical activity, sitting time, sleep duration, processed meat consumption, vegetable, fruit, and alcohol consumption, and smoking status).

🥺Compared to those who did not have any unhealthy behaviors, those who reported two or more instances of these were more prone to experiencing psychological distress at baseline. Additionally, the participants with five or more unhealthy behaviors at baseline assessment showed significantly higher odds of developing psychological distress at 3-6 year follow-up.

Reference:
George ES, Davidson I, El Masri A, Meade T, Kolt GS. Unhealthy Lifestyle Behaviours and Psychological Distress: A Longitudinal Study of Australian Adults Aged 45 Years and Older. Int J Environ Res Public Health. 2022 Apr

Mindfulness & Meditation apps help reduce work stress and pro-inflammatory gene expression.

(Dutcher et al., 2022)

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😫Chronic stress can negatively affect physical and mental health by activating the sympathetic nervous system (the “flight or fight” response) and proinflammatory gene expression. Practicing mindful meditation can help people manage stress and improve their mental and physical health.

📲Dutcher et al., 2022, a randomized controlled trial investigated the effect of a 30-day smartphone-based mindfulness meditation training program for stress management (delivered via the Headspace app), compared to a problem-solving control program (the Recharge app), on 100 stressed customer service employees.

😇Both mindfulness (Headspace) and problem-solving (Recharge) apps reduced perceived stress levels. Mindfulness meditation training app reduced pro-inflammatory gene expression. These results suggest mindfulness training may be a particularly effective method for improving immune cell gene expression in stressful work environments.

Reference:
Dutcher JM, Cole SW, Williams AC, Creswell JD. Smartphone mindfulness meditation training reduces Pro-inflammatory gene expression in stressed adults: A randomized controlled trial. Brain Behav Immun. 2022 Jul;103:171-177

Eating blueberries daily improves memory and executive function.

(Krikorian et al., 2022)
🫐🧠🧬👩‍💼

🧠Preventing cognitive decline is key to reducing the risk of dementia since there is no treatment for dementia currently. Positive lifestyle changes (e.g., proper nutrition) at the beginning of midlife possibly reduce neurodegenerative changes in late life.

🧬Blueberries contain anthocyanins and proanthocyanidins (bioactive flavonoids), among other nutritional components that may have health benefits. Krikorian et al., 2022 randomized controlled trial evaluated the effect of eating blueberries on cognitive health in 33 middle-aged adult participants with overweight and subjective cognitive decline (i.e., at risk of future dementia).

🫐An amount equal to 0.5 cups (roughly 85g) of the whole fruit was consumed daily in the frozen powder version for 12 weeks.

👩‍💼Daily blueberry supplementation improved executive function, memory, and fasting insulin but did not affect blood lipids.

Reference:
Krikorian R, Skelton MR, Summer SS, Shidler MD, Sullivan PG. Blueberry Supplementation in Midlife for Dementia Risk Reduction. Nutrients. 2022 Apr 13.

Consuming 7-10g carbohydrate per kilogram of body weight after 90 minutes of exhaustive exercise resulted in greater muscle glycogen replenishment than consuming 5 g/kg of carbohydrate.

(Motonaga et al., 2022)

🚴 🥵 🍟 🔋

🏃 There is a strong relationship between muscle glycogen levels and endurance performance. Blood glucose and muscle glycogen are the primary source of energy to sustain brief (10–180 seconds) high-intensity exercise and are a major source of energy for events lasting longer than 2 minutes (Thomas et al., 2016).

🚴 In a randomized crossover trial, Motonaga et al., 2022, eight male Japanese collegiate endurance athletes (average age of 20, average VO2max of 56 millimeters/kilogram of body weight/minute) completed an approximately 90-minute incremental (increasing by 20 watts every minute) cycling test until voluntary exhaustion. They consumed one of three diets: 5 grams of carbohydrate per kilogram of body weight, 7 g/kg, or 10 g/kg during the 24-hour recovery period after the test. The three diets provided the same amount of energy and protein.

⬇️ Muscle glycogen levels before exercise were not different between conditions, and exercise decreased muscle glycogen similarly in each state (27–33%).

🔋 Muscle glycogen recovery was greater in the 7 g/kg and 10 g/kg conditions compared to the 5g/kg condition. Muscle glycogen levels recovered to 81.7% with 5g/kg, 97.1% with 7g/kg, 100% with 10g/kg after 24 hours.

JP This study only included young Japanese men, so the results may not be generalizable to other populations since the metabolic response to carbohydrate intake varies between ethnicities, although these findings align with previous evidence.

🥇 Recommend carbohydrate intake for athletes (Thomas et al., 2016)
Low-intensity or skill-based activities; 3-5g/kg/day
Moderate-intensity exercise lasting about one hour; 5-7g/kg/day
High-intensity exercise lasting 1–3 hours; 6-10g/kg/day

Moderate-to high-intensity exercise lasting 4–5 hours; 8-12g/kg/day

🍟Hi GI carb sources are faster absorbed and a better choice during short recovery periods (e.g., multiple bouts on the same day). Also, timing and feeding frequency become more important factors in short recovery periods. But during more extended recovery periods (24 hours or more), when athletes have time to consume adequate carbohydrates, the type of carbohydrate and the timing of intake can be selected according to personal preference.

Reference:
Namma-Motonaga, K.; Kondo, E.; Osawa, T.; Shiose, K.; Kamei, A.; Taguchi, M.; Takahashi, H. Effect of Different Carbohydrate Intakes within 24 Hours after Glycogen Depletion on Muscle Glycogen Recovery in Japanese Endurance Athletes. *Nutrients* 2022, *14*, 1320. https://doi.org/10.3390/nu14071320

Thomas DT, Erdman KA, Burke LM. American College of Sports Medicine Joint Position Statement. Nutrition and Athletic Performance. Med Sci Sports Exerc. 2016 Mar

Daily feedback on physical activity and sleep habits measured by activity and sleep tracker increased daily step count, time spent jogging, reduced sleep latency, and improved body composition.

(Browne et al., 2021)

⌚🏃‍♀️😴💪🏽

🏃‍♀️ A significant portion of the adult population fails to meet guidelines for recommended exercise despite the widespread awareness of the benefits of regular exercise and physical activity. Inadequate sleep quality and duration are also common and contribute to an increased risk of noncommunicable diseases (e.g., cardiovascular disease).

⌚ A growing body of evidence suggests that wearable digital health technology (i.e., wearable activity trackers and sleep monitors) help people improve their sleep quality and manage their physical activity levels. It can motivate users and help them make informed decisions.

🧮 Browne et al., 2021, a 12-month randomized controlled trial, 56 participants who performed little to no exercise in the past three months wore a biometric tracking ring. They were assigned to either a behavioral modification intervention with daily guided text-message feedback (INT group) or the same behavioral modification intervention without the daily guided text-message feedback (control group). All participants were instructed to walk or jog at least 150–300 minutes per week and increase their walking speeds to a comfortable jog over time.

🚫 After three months, the participants from the behavioral modification intervention with daily guided text-message feedback group were further randomized to continue receiving daily text-message feedback or no feedback. Guided daily text feedback was individualized based on physical activity and sleep data from the past 24 hours.

👏🏽 Examples of daily Guided Text Feedback:

• “You took 8,235 steps yesterday with 10% of your time spent jogging.”
• “Wonderful job! This week your average step count increased by 800 compared to last week.”
• “Your sleep and heart rate variability trends this week indicate good sleep and adequate recovery. Let’s strive for a larger portion of steps from jogging this week.”

💪🏽In the first three months, behavioral modification intervention with daily guided text-message feedback group improved sleep latency and body fat percentage compared control group. The daily step count increased from 7446 to 9626. In the following nine months, the group continued to receive daily text feedback continued to make improvements while no text group remained stagnant or slightly regressed.

Reference:
Browne JD, Boland DM, Baum JT, Ikemiya K, Harris Q, Phillips M, Neufeld EV, Gomez D, Goldman P, Dolezal BA. Lifestyle Modification Using a Wearable Biometric Ring and Guided Feedback Improve Sleep and Exercise Behaviors: A 12-Month Randomized, Placebo-Controlled Study. Front Physiol. 2021 Nov 25;12:777874. doi: 10.3389/fphys.2021.777874.

1-2 alcoholic drinks per day (7-14 drinks per week) can shrink the brain over time.

(Daviet et al., 2022)

🛁🍹🧠⬇️

🍻Chronic alcohol consumption is linked to adverse changes in brain structure, loss of neurons, and reduction in brain size (brain atrophy). These effects are even more severe in older adults.

🧬Daviet et al., 2022 a cohort study analyzed alcohol intake data from 36,768 participants (ages 40–69) in the UK Biobank in conjunction with data on brain structure.

🧠Adverse effects of alcohol consumption were apparent in participants who consumed as little as 1-2 drinks per day (7-14 drinks per week), but adverse effects got more severe with increased alcohol intake. Adverse effects were shown in both the microstructural and macrostructural levels in the brain. Alcohol intake was associated with decreases in global brain volume, regional gray matter volume, and microstructure of the white matter.

Reference:

Daviet R, Aydogan G, Jagannathan K, Spilka N, Koellinger PD, Kranzler HR, Nave G, Wetherill RR. Associations between alcohol consumption and gray and white matter volumes in the UK Biobank. Nat Commun. 2022 Mar 4

Is Morning Exercise better for Women and Evening Exercise better for Men?

(Arciero et al., 2022)

🌞💃😌🕺

🌔According to the current best research, evening training seems slightly superior for peak performance (Knaier et al., 2022). It's an important question to raise, does this differ in men and women?

🏋️‍♀️Arciero et al., 2022 a 12-week randomized trial investigated whether resistance, interval, stretching, and endurance exercise affect differently for men and women. The participants were randomly assigned to complete training sessions in the morning between 6:30 and 8:30 a.m. (AM exercise) or in the evening between 6:00 and 8:00 p.m. (PM exercise). All study outcomes were measured at baseline (week 0) and at the end of the intervention (week 13).

💃In women, AM exercise reduced total fat mass by extra 3%, abdominal fat mass by 7%, blood pressure by 7%, and increased lower body muscle power by 9% compared to evening exercise. Surprisingly PM exercise improved upper body muscle strength by an extra 7%, upper body muscle power by 29%, and upper body endurance by 15% compared to AM exercise. PM exercise also improved mood and satiety more than AM exercise.

🕺 In men, PM exercise increased fat oxidation by an extra 5%, reduced blood pressure by 9%, and fatigue by a whopping 55% compared to AM training. Both AM & PM exercise improved performance and body composition, with no difference between groups.

🍱Caloric intake, macronutrient composition, and meal timing were tightly controlled in this study, so these findings are unlikely influenced by nutrition or other lifestyle factor and are more likely due to training time of the day.

🥛Practical Application:

· There is no significant difference between AM & PM training for men except for fatigue. If you are experiencing a lot of fatigue from training, you can try changing the training time to the evening.

· On the other hand, AM training seems to be better for lower body training, and PM training appears to be better for upper body training and mood for women.
· For an average person (including myself), I wouldn't worry too much about specific training times. I'd get it done when it's practical and convenient.
· For professional athletes competing in competitive sports, it's worth exploring training in optimal training times.

Reference: Arciero PJ, Ives SJ, Mohr AE, Robinson N, Escudero D, Robinson J, Rose K, Minicucci O, O'Brien G, Curran K, Miller VJ, He F, Norton C, Paul M, Sheridan C, Beard S, Centore J, Dudar M, Ehnstrom K, Hoyte D, Mak H, Yarde A. Morning Exercise Reduces Abdominal Fat and Blood Pressure in Women; Evening Exercise Increases Muscular Performance in Women and Lowers Blood Pressure in Men. Front Physiol. 2022 May 31

Yoga offers neuroprotective effects against cognitive decline.

(Krause-Sorio et al., 2022)
🧘🏽🧠🤸🏽😌

🧘🏽 Yoga has shown several positive effects on physical health, including improved blood pressure, increased flexibility, strength, balance, and endurance.

😌 Yoga has also shown positive effects on depression, resilience, memory and executive functions, increased hippocampal choline concentrations and modulated brain connectivity.

👩🏻‍⚕️ Krause-Sorio et al., 2022 a randomized controlled trial on whether yoga could improve memory or brain aging biomarkers in women with subjective cognitive decline and cardiovascular risk factors.

🧠 Yoga group showed an increased or stable gray matter volume, depending on the region of the brain analyzed. The yoga group also significantly decreased anxiety and depression.

😇 According to the study authors, the results suggest that yoga training may help to mitigate neurodegeneration and cognitive decline during aging, even over short time intervals.

Reference:
Krause-Sorio B, Siddarth P, Kilpatrick L, Milillo MM, Aguilar-Faustino Y, Ercoli L, Narr KL, Khalsa DS, Lavretsky H. Yoga Prevents Gray Matter Atrophy in Women at Risk for Alzheimer's Disease: A Randomized Controlled Trial. J Alzheimers Dis. 2022;87(2):569-581.

Hot Pack Therapy reduces DOMS within the first 48 hours more effectively than Cryotherapy. But Cryotherapy is more effective in reducing DOMS >48 hours after exercise.

(Wang et al., 2022)

🏋🏾‍♀️🔥🏃🏾‍♀️❄️

🚵🏾‍♀️Delayed onset muscle soreness (DOMS) is muscle soreness in the hours or days following physical activity. DOMS can negatively affect subsequent training sessions and competitions.

🔥Many people use cold and heat-based therapy to reduce DOMS after exercise, although the effectiveness of these methods is unclear.

👩🏻‍⚕️Wang et al., 2022, a network analysis of randomized controlled trials compared the effectiveness of cold and heat therapies for DOMS.

⏳The following ten interventions were examined:

- Contrast water therapy
- Phase change material
- Cryotherapy
- Cold water immersion
- Hot/warm water immersion
- Cold pack therapy
- Hot pack therapy
- Ice massage
- Ultrasound
- Passive recovery (a control condition)

Results:

🔥At 24 hours - Hot pack therapy was the most effective, 2nd; contrast water therapy and 3rd; cryotherapy.

🔥At 48 hours - Hot pack therapy was the most effective, 2nd; cryotherapy and 3rd phase change materials.

❄️>48 hours after exercise - Cryotherapy was the most effective, 2nd; phase change materials, and 3rd; contrast water therapy.

Note:

Hot pack therapy - applying heat wraps to a target muscle for several hours after exercise.

Contrast water therapy - alternating between cold and warm water immersion.

Cryotherapy - short exposure to extremely cold air.

Phase change materials - clothing materials absorb heat energy, resulting in a cooling effect.

Reference:
Wang Y, Lu H, Li S, Zhang Y, Yan F, Huang Y, Chen X, Yang A, Han L, Ma Y. Effect of cold and heat therapies on pain relief in patients with delayed onset muscle soreness: A network meta-analysis. J Rehabil Med. 2022 Feb 8;54:jrm00258.

Seven most consistent habits among people who maintained long-term weight loss.

(Paixão et al., 2020)

🌻🚶‍♀️⚖️🥤

⚖️Maintaining weight loss long-term is one of the biggest challenges in obesity treatment. Majority of the people who lose weight fail to maintain the results long-term.

🦹‍♀️Success leaves clues. Paixão et al., 2020 investigated the existing weight control registries and their participants to identify psychological and behavioral factors contributing to better long-term success.

🌎This systematic review included 52 studies involving registries from the US, Germany, Portugal, Finland, and Greece.

<u>Most frequently reported habits</u>
Having healthy foods available at home
Regular breakfast intake
Increasing vegetable consumption
Decreasing sugary and fatty foods
Limiting certain foods
Reducing fat in meals
Increased physical activity

🎯Self-monitoring/self-weighing and specific goal setting are noteworthy as well.

😌Weight maintenance becomes easier over time when behaviors become habits (when requires less conscious effort).

Reference:
Paixão C, Dias CM, Jorge R, Carraça EV, Yannakoulia M, de Zwaan M, Soini S, Hill JO, Teixeira PJ, Santos I. Successful weight loss maintenance: A systematic review of weight control registries. Obes Rev. 2020 May;21(5):e13003.

The minimal dose of exercise is needed to preserve endurance and strength.

(Spiering et al., 2021)

⏳🏃‍♂️💪🏽🏋️‍♀️

⏳ Nearly everyone encounters periods that they struggle to find enough time to train (when traveling, busy season at work, newborns, family commitments, etc.). In these times, it's more realistic to try to maintain LBM, Strength & Performance rather than improve.

👩🏻‍⚕️ Spiering et al., 2021 a narrative review, examined the minimal dose of exercise (i.e., frequency, volume, and intensity) needed to maintain physical performance over time.

🧒🏽 In younger populations (20-35 years), Strength & Size can be maintained with one session per week and one set per exercise for up to 32 weeks as long as exercise intensity (relative load) is maintained.

👴🏻 In older populations, two sessions per week and 2-3 sets per exercise while maintaining intensity may require for maintaining muscle size.

Note:

❓ This study has a few limitations, so we must be careful in interpreting results.

🚨 Practical Application:

The biggest takeaway is to eliminate the "all-or-nothing mentality." Everyone encounters times they struggle to find time to train. I have often seen people stop training altogether, thinking, "oh, there's no point doing this if I can't do it properly. Learn to modify training variables according to your time availability and never completely stop exercising.

I'm skeptical if one session per week and one set per exercise are enough to maintain muscle mass for up to 32 weeks. But one session is better than zero. In my experience, 2-3 sessions 30-45 mins training

sessions per week are great for maintaining size & strength for a while. You can get a lot done in 30-45 min sessions if you are smart with programming.

Reference:
Spiering BA, Mujika I, Sharp MA, Foulis SA. Maintaining Physical Performance: The Minimal Dose of Exercise Needed to Preserve Endurance and Strength Over Time. J Strength Cond Res. 2021 May

9 Strategies to tackle Mental Fatigue.

(Proost et al., 2022)

☕🍡👹👺

😓Mental fatigue negatively affects recovery and physical and cognitive performance in several ways.

🧬Proost et al., 2022 analyzed behavioral, physiological, and psychological strategies to reduce mental fatigue from 33 studies.

Results:

1. Caffeine + Maltodextrin (drink or mouth rinse).
   Caffeine alone or combined with glucose reduced symptoms of mental fatigue. A caffeine and maltodextrin mouth rinse also improved task performance.
2. Music and binaural beats.
   "A binaural beat is an illusion created by the brain when you simultaneously listen to two tones with slightly different frequencies." You need to listen with stereo headphones for it to work.
3. Mechanical massage.
   massage is the manipulation of soft tissues using machines.
4. Mild steam bathing.
5. Exposure to a natural environment.
6. Mindfulness training.
7. Naps and rest periods.
8. Light aerobic exercise.
9. Motivation interventions, such as adding a time-based reward.

Reference:

Proost M, Habay J, De Wachter J, De Pauw K, Rattray B, Meeusen R, Roelands B, Van Cutsem J. How to Tackle Mental Fatigue: A Systematic Review of Potential Countermeasures and Their Underlying Mechanisms. Sports Med. 2022 Sep;52(9):2129-2158.

Is Spot Reduction (Target Fat Loss to Specific Body Parts) Possible?

(Ramirez-Campillo et al., 2022)
🧀🚴🎯📉

👯Almost everyone has one or more areas in which they want to lose more body fat. Spot reduction refers to the idea that specific exercises reduce more fat in the area or muscle group the exercise targets.

🎯Targeted fat loss (spot reduction) has been promoted in the fitness industry for a long time as a solution to losing stubborn fat (lose fat in problematic areas).

📺This idea most certainly increased sales of ab workout machines. Do you remember those TV commercials?

👩‍⚕️Ramirez-Campillo et al., 2022 a systematic review and meta-analysis, summarised the findings of 13 studies that assessed the possibility of spot reduction.

🔍Findings & Conclusions:
Localized muscle training **did not increase fat loss** in that area (spot reduction).

🔏 Key takeaways:
Some individuals have disproportionate fat distribution, while some carry body fat proportionately. Genetics, gender, and hormones play a significant role in fat storage in specific areas. According to the current best evidence, spot reduction doesn't appear achievable. At least we don't know an effective method for spot reduction. So, we can rule out spot reduction for now. Focus on overall fat loss, and some individuals may have to get into lower body fat levels to see a decrease in fat in stubborn areas.

Reference:
Ramirez-Campillo R, Andrade DC, Clemente FM, Afonso J, Pérez-Castilla A, Gentil P. A proposed model to test the hypothesis of exercise-induced localized fat reduction (spot reduction), including a systematic review with meta-analysis. Human Movement. 2022;23(3):1-14. doi:10.5114/hm.2022.110373.

How many Sets should you do to optimize Muscle Growth?

(Baz-Valle et al., 2022)
🎯🏋️‍♀️🔬💪🏽

🎯The main goal of this study was to compare responses to moderate and high training volumes aimed at inducing muscle hypertrophy.

📝Note: Technical definition of Training Volume = Reps x Sets x Weight. In this post, I'm referring to "Volume" as the number of sets.

Low Volume - Less than 12 sets per muscle group per week
Moderate - 12-20 weekly sets
High - 20+ weekly sets

🔬There was no significant difference in muscle growth between moderate (12-20 sets) and high (20+) weekly sets except for triceps. The higher volume produced more muscle growth in the triceps. Triceps act as a synergist and not as an antagonist in most multi-joint exercises is probably the possible reason for this.

✍🏽Practical Application:

- **12-20 weekly sets** are **optimal** for muscle growth.
- Muscles work as a synergist in multi-joint exercises may benefit from higher volumes (based on treating one set of multi-joint exercises as a set for all muscle groups involved. For example, one set of chin-ups counts as one set for the back and one set for the biceps. Side note: I don't personally agree with this approach, but that was the basis of this study)
- Lagging body parts may benefit from higher training volumes.
- Assess your **training technique** & **proximity to failure** before you increase training volume. I have seen far too many times that people can't gain muscle with high volumes, and they start growing with lower volumes when you fix technique and get them to train close to failure. Increasing training volume with poor technique and lazy sets is just increasing junk volume. In other words, a huge waste of time.

Reference:
Baz-Valle E, Balsalobre-Fernández C, Alix-Fages C, Santos-Concejero J. A Systematic Review of The Effects of Different Resistance Training Volumes on Muscle Hypertrophy. J Hum Kinet. 2022 Feb 10;81:199-210.

Pre and Intra workout Carbohydrate consumption is beneficial when training sessions are longer than 45 mins and training after over 8 hours of fasting.

(King et al., 2022)

🥪🏋️‍♂️⏰😴

👎🏻 Most studies show no additional benefits to pre and intra-carbohydrate consumption. However, there seem to benefit from acute carbohydrate intake for longer training sessions and when training after 8 hours or more fasting period.

🪩 King et al., 2022, a Systematic review and meta-analysis, assessed what degree CHO ingestion influences RT performance.

🗝Findings & Key takeaways:

- There are benefits to pre and intra-workout carbohydrate consumption, but only under certain circumstances.
- Carbohydrate consumption before and during resistance training allows for greater volume to be completed during sessions lasting longer than 45 min and consisting of at least 8–10 sets.
- If you are training first thing in the morning, having a high-carb meal for dinner the previous night is beneficial.
- You don't need to worry about pre and intra-workout carb consumption if your training session lasts less than 45 minutes.

Reference:
King, A., Helms, E., Zinn, C. *et al.* The Ergogenic Effects of Acute Carbohydrate Feeding on Resistance Exercise Performance: A Systematic Review and Meta-analysis. *Sports Med* (2022).

Collagen Protein vs Whey Protein: Which is better?

(Jacinto et al., 2022)

🧐Several previous studies have shown that Whey Protein is better for muscle growth than lower-quality proteins such as soy and collagen. But the question remains if other proteins have similar effects when protein synthesis stimulating amino acid “leucine” amounts equal in all proteins.

🔬Jacinto et al., 2022 a randomized controlled trial examined the effects of whey protein compared to leucine-matched collagen protein on muscle and strength gains after a 10-week resistance training program.

🥤The whey protein supplement consisted of 35g of whey with 3g of leucine. Collagen supplement also consisted of 35g but only 1g of leucine. 2g additional leucine was added to the collagen supplement to match whey protein.

🔍Findings:

- Vastus lateralis muscle increased by 8.4% in the whey group compared to only a 5.6% increase in the collagen group.
- Biceps brachii increased by 10.1% in the whey group compared to 6.0% in the collagen group.

📍Conclusion:

Whey Protein is better than Collagen Protein for Muscle Growth.

✍🏽Note:

Even though the leucine amount matched in both whey and collagen, the whey protein used in the study contained 13.9 grams of EAAs, compared to only 7.7 grams of EAAs in the collagen. That may have been the reason for better muscle growth in the whey group.

Reference:

Jacinto JL, Nunes JP, Gorissen SHM, Capel DMG, Bernardes AG, Ribeiro AS, Cyrino ES, Phillips SM, Aguiar AF. Whey Protein Supplementation Is Superior to Leucine-Matched Collagen Peptides to Increase Muscle Thickness During a 10-Week Resistance Training Program in Untrained Young Adults. Int J Sport Nutr Exerc Metab. 2022 May 1;32(3):133-143.

Can weight loss slow your Metabolism?

(Nunes et al., 2022)

⚡ Your body requires energy (burns Calories) to maintain body weight. Even maintaining fat mass requires energy. Therefore, the heavier you are more energy (Calories) you need to maintain body weight.

🪂 If you lose weight, your body needs to burn fewer Calories to maintain your new body weight. A smaller body requires less energy. But in some cases, this decrease in energy expenditure is larger than what can be explained by the loss of body weight. This is called "adaptive thermogenesis."

❤️‍🔥 Adaptive Thermogenesis is when your body reduces its heat production to conserve energy to keep you from starving when food is scarce. It makes sense from a survival point of view, but it can be a problem if you are trying to lose weight.

🔬 Nunes et al., 2022 examined,

1. If Adaptive Thermogenesis (AT) occurs after moderate Weight Loss and if AT persists after a period of weight loss maintenance.
2. If AT is associated with changes in body composition, hormones, and energy intake.

🏂 94 sedentary former elite athletes were randomized to a 12-month lifestyle intervention group or a waitlist control group. The participants in the lifestyle intervention underwent a 4-month weight-loss period followed by an 8-month weight maintenance period.

✅ Results:

- Participants in the intervention group lost 4.8kgs during the 4 months weight-loss period and kept it off at the 12th month (end of the study). The measured (actual) Resting Energy Expenditure was 85 Calories lower than the Predicted Resting Energy Expenditure at 4 months and 72 Calories lower at 12 months. So REE only went up by 13 Calories after 8 months of weight loss maintenance.
- Participants with bigger energy deficits had higher adaptive thermogenesis at 12 months.

- Participants with adaptive thermogenesis experienced less weight loss and fat loss and had a lower baseline energy intake.

Reference:

Nunes CL, Jesus F, Francisco R, Hopkins M, Sardinha LB, Martins P, Minderico CS, Silva AM. Effects of a 4-month active weight loss phase followed by weight loss maintenance on adaptive thermogenesis in resting energy expenditure in former elite athletes. Eur J Nutr. 2022 Jul 14.

Insufficient sleep in children could have a long-lasting impact on neurocognitive development.

(Yang et al., 2022)

👦🏽 Children frequently report not getting enough sleep, which has a negative impact on brain development. According to the American Academy of Sleep Medicine, children 6 to 12 years old need at least 9 hours of sleep per day. Children with insufficient sleep have been shown to hinder academic performance and reduce social and emotional skills relative to children who get sufficient levels of sleep.

👨🏻‍💼 Yang et al., 2022 a 2-year longitudinal cohort study with 11,875 children (ages 9–10 years old), examined the effects of insufficient (less than 9 hours) sleep on cognition, behavior, mental health, and structural and functional changes in the brain.

🚨 Results:

- At baseline, lack of sleep had a negative impact on a range of behavioral outcomes, with the most significant effects noted for depression, thought problems, and crystallized intelligence (knowledge that comes from prior learning and past experiences).
- In 12 of the 84 brain regions that were measured and gray matter volume at the start of the study and two-year follow-up showed a significant difference between children who got enough sleep and those who didn't.

💡 Conclusion:

The effects of insufficient sleep on a child's neural and cognitive development seem to be long-lasting. This suggests that early sleep interventions may be crucial for improving the trajectory of long-term brain development.

Time Restricted Eating (TRE) reduces Calorie absorption?

(Bao et al., 2022)

⏰ Time-restricted eating or intermittent fasting gained popularity over recent years as an effective method for weight loss. TRE focuses on the length of the eating window without necessarily altering diet quantity or quality.

🧐 Is the effectiveness of TRE just a result of limiting energy intake, or are there other ways it causes a negative energy balance?

👩‍🔬 In this randomized crossover trial, 12 healthy participants (average age of 24; average BMI of 22; five men, seven women) ate the same isocaloric diet (three meals per day; 55% of energy from carbohydrates, 30% from fat, and 15% from protein) within a 5.5-hour eating window (TRE condition; 8 a.m. to 1:30 p.m.) and an 11-hour eating window (control condition; 8 a.m. to 7 p.m.). There was a one-week washout period between each state.

🚨 This study was tightly controlled (a big strength of the study). All energy intake and excretion were traced, collected, and accessed by bomb calorimetry. Energy expenditure and substrate oxidation were monitored in a metabolic chamber.

💡 Results:
TRE increased fecal calorie excretion by 23% (about 32 kcal) and a nonsignificant increase in urinary calorie excretion (by about 7 kcal), leading to a negative energy balance without affecting other aspects of energy expenditure (such as the thermic effect of food, basal metabolic rate, exercise-activity thermogenesis, and nonexercise activity thermogenesis).

👍🏽 Practical Application & Final Note:
I find this study interesting for two reasons,

1. It's the first of its kind (as far as I'm aware)
2. It was rigorously controlled. There for, the results are unlikely to affect by external factors.

💩 Participants absorbed fewer Calories in smaller feeding windows. That's why there were more calories in stools. I assume that Calorie absorption in the digestive system is less efficient when you cram a lot of

Calories into a smaller window. The positive here is the apparent increase in the negative energy balance; the possible negative micronutrient absorption from food is likely less efficient as well in smaller feeding windows.

🦩 TRE resulted in roughly 40 Calories less absorption compared to spreading the same meals over 11 hours. It's statistically significant. This is not a significant enough advantage for me to change my eating patterns. Nonetheless, it's an interesting finding.

Reference:
Bao R, Sun Y, Jiang Y, Ye L, Hong J, Wang W. Effects of Time-Restricted Feeding on Energy Balance: A Cross-Over Trial in Healthy Subjects. Front Endocrinol (Lausanne). 2022 Apr 27;13:870054.

Physical activity plus fruit-vegetable consumption reduces the risk of depression by 80%.

(Fann et al., 2022)

🎭Depression is one of the most common mental disorders in the world, and it is estimated that during the COVID-19 pandemic, there was a 23 percent increase in major depressive disorders globally.

🧖‍♀️ Although the causes of depression are complex, researchers are beginning to understand how specific lifestyle interventions can reduce the risk of depression. Physically active people, for example, have fewer depression symptoms than those who do not exercise. High consumption of fruits and vegetables has also been linked to a lower risk of depression. However, no study has yet looked into the effectiveness of combining physical activity with a high fruit and vegetable intake in lowering the risk of depression.

🔬Fann et al., 2022 a 16-year longitudinal cohort study that examined the association between physical activity and intake of fruits and vegetables and the risk of depression in 1,795 middle-aged and older Taiwanese adults.

Researchers grouped the participants into low, moderate, and high levels of physical activity and fruit–vegetable intake.

🚶 Physical Activity
Low - Less than 450 metabolic equivalents per week
Moderate - Between 450–750 metabolic equivalents per week
High - More than 750 metabolic equivalents per week

🍉Fruit-vegetable intake
Low – Less than seven servings per week
Moderate – 7-9 servings per week
High – more than nine servings per week

🚣Results:

- When high physical activity and high fruit-vegetable intake were compared separately, each was associated with a 40% lower risk of depression.
- Combined high physical activity and fruit-vegetable intake reduced the risk of depression by 80%.

- Combined high physical activity and low or moderate fruit-vegetable intake were linked to a 70% lower risk of depression.
- Combined low or medium physical activity and high fruit-vegetable intake were linked to a 65% lower risk of depression.

Reference:
Fann LY, Huang SH, Huang YC, Chen CF, Sun CA, Wang BL, Chien WC, Lu CH. The Synergetic Impact of Physical Activity and Fruit and Vegetable Consumption on the Risk of Depression in Taiwanese Adults. Int J Environ Res Public Health. 2022 Jun 14;19(12):7300.

Healthy dietary patterns improve sperm quality.

(Cao et al., 2022)

👫There has been a spike in the prevalence of infertility in recent years. The quality of the sperm is a crucial indicator of their fertility, and dietary choices can affect sperm quality.

🧿 Cao et al., 2022, a meta-analysis of 6 studies (4 cross-sectional, one prospective cohort, and one randomized controlled trial) included a total of 708 men examined sperm concentration, total sperm count, normal sperm morphology, total sperm motility, progressive sperm motility, and sperm volume.

🔥 Results:
The greater the adherence to a healthy dietary pattern, the significantly higher the sperm concentration, the total sperm count, and the progressive motility of the sperm compared to the lowest level of adherence.

Reference:
Cao LL, Chang JJ, Wang SJ, Li YH, Yuan MY, Wang GF, Su PY. The effect of healthy dietary patterns on male semen quality: a systematic review and meta-analysis. Asian J Androl. 2022 Sep-Oct;24(5):549-557.

Sodium Bicarbonate (baking soda) supplementation improves anaerobic and cognitive performance.

(Chycki et al., 2022)

🤼Athletes competing in combat sports must be able to absorb and process a great deal of constantly shifting information and respond appropriately to it within a short amount of time. This requires having sufficient cognitive flexibility and executive functioning, especially working memory.

🧠Brain-derived neurotrophic factor (BDNF) and insulin-like growth factor 1 (IGF-1) have been suggested as potential exercise-induced facilitators of memory.

🤓Background:
It is believed that lactate, created during anaerobic activity, is the catalyst that sets off the release of BDNF and IGF-1. When lactate is produced through anaerobic glycolysis, hydrogen ions are also formed. This results in a decrease in pH within the muscle, which increase fatigue. It has been demonstrated that supplementation with sodium bicarbonate can increase the hydrogen-ion buffering capacity in skeletal muscle, increasing lactate accumulation. Muscles secrete lactate into the bloodstream, where it can pass the blood-brain barrier and serve as an energy source and neuroprotective element.

🥷Chycki et al., 2022 a 21-day randomized controlled trial, investigated the effect of sodium bicarbonate supplementation on physical and cognitive performance. Sixteen male combat athletes (average age of 24) took either sodium bicarbonate (5 grams twice per day) or a placebo.

🏆Results:

- There were substantial increases in postexercise lactate concentrations, upper whole limb work, and mean power output in the subjects who took sodium bicarbonate.
- Compared to the placebo group, there was a substantial increase in post-testing lactate levels and working memory in the bicarbonate group.
- The lack of association between IGF-1 and BDNF levels and working memory in this study suggests that exercise-induced lactate increases may be the primary cognitive mechanism driving athletes' cognitive performance.

Reference:

Chycki J, Zajac A, Toborek M. Bicarbonate supplementation via lactate efflux improves anaerobic and cognitive performance in elite combat sports athletes. Biol Sport. 2021 Oct;38(4):545-553. doi: 10.5114/biolsport.2020.96320. Epub 2020 Dec 30. PMID: 34937963; PMCID: PMC8670805.

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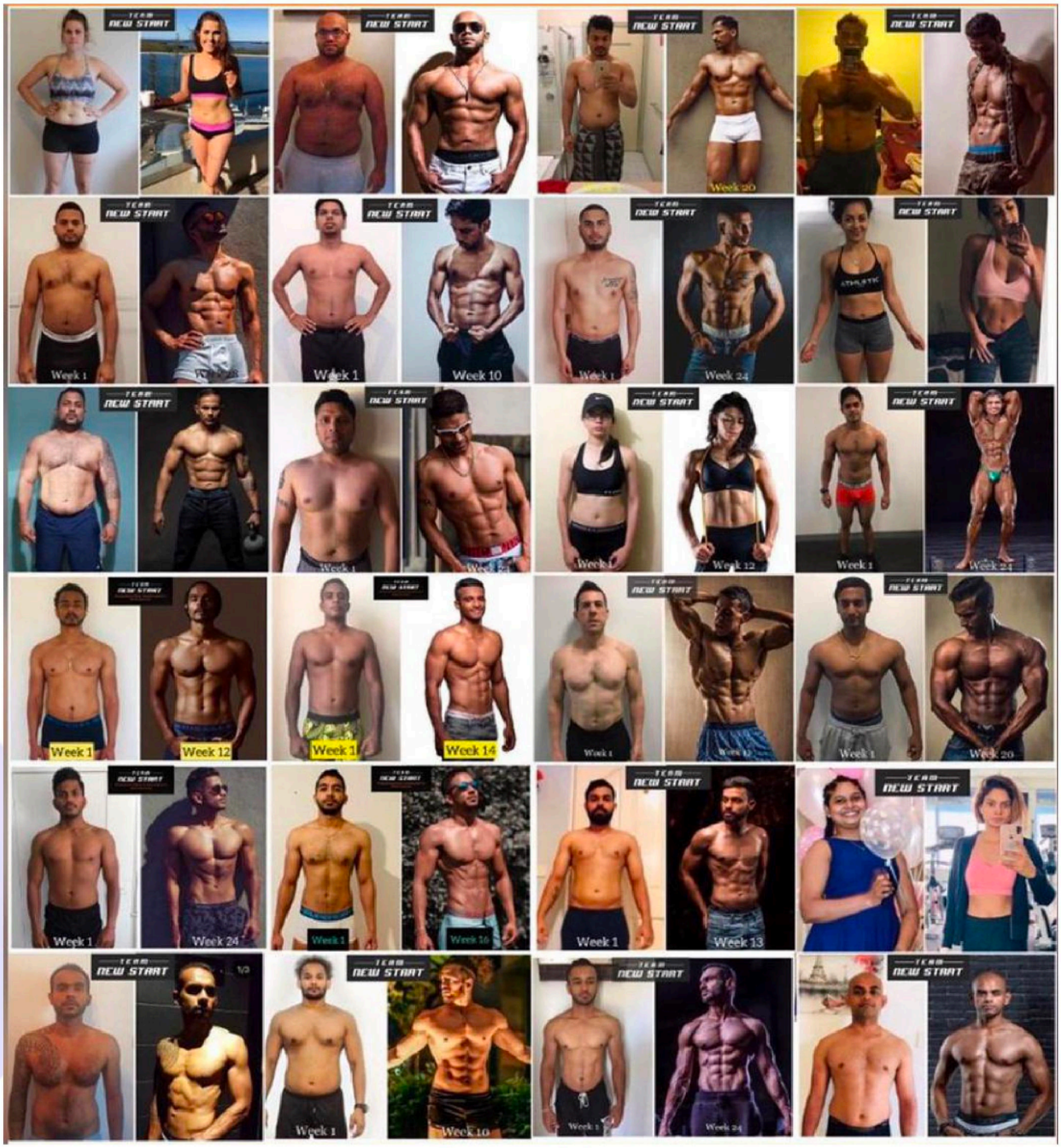

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