

FILEX 2017

STRENGTH TRAINING WOMEN

Tony Boutagy & Claire Norgate

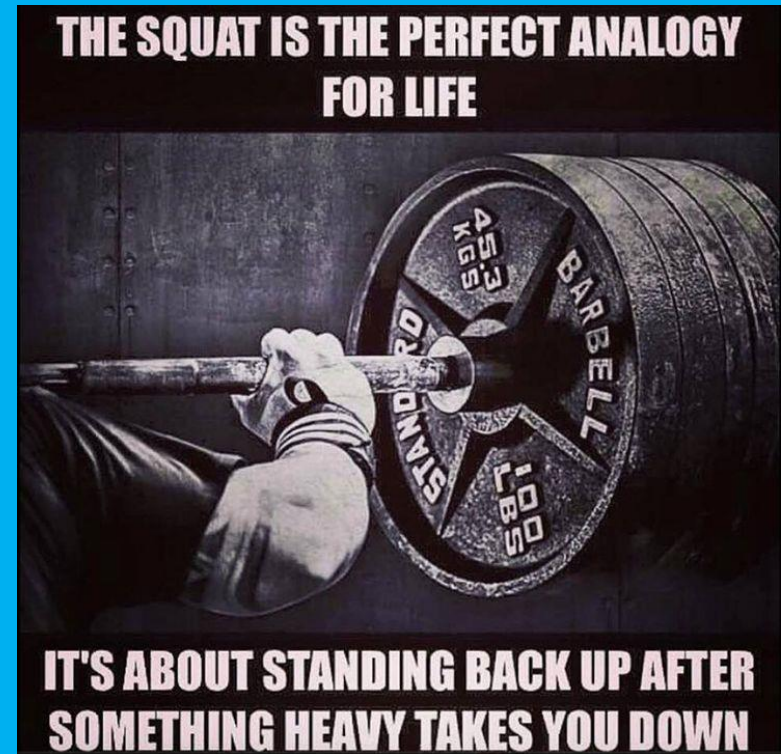


WE ARE ALL WONDERWOMEN!



Session Overview

- Benefits
- Assessment
- Hormone influences
- Age variations
- Program ideas
- Safe & effective progressions



Why strength train women?

Health (↓T2DM, ↓LDL,)

Injury prevention (↓falls/#'s)

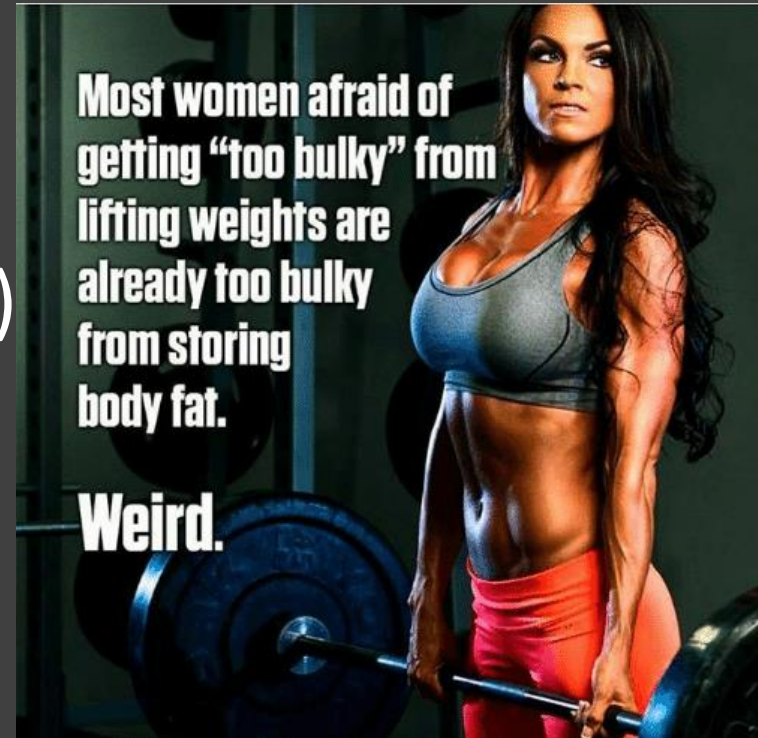
Sarcopenia (high RM or Volume)

Fat loss

Osteoporosis – HI Loading

Body shape

Mental health/Cognitive functioning



(Grøntved et.al. 2014, Karinkanta et.al. 2015, Manning et.al. 2014, Watson 2015, Strickland 2014)

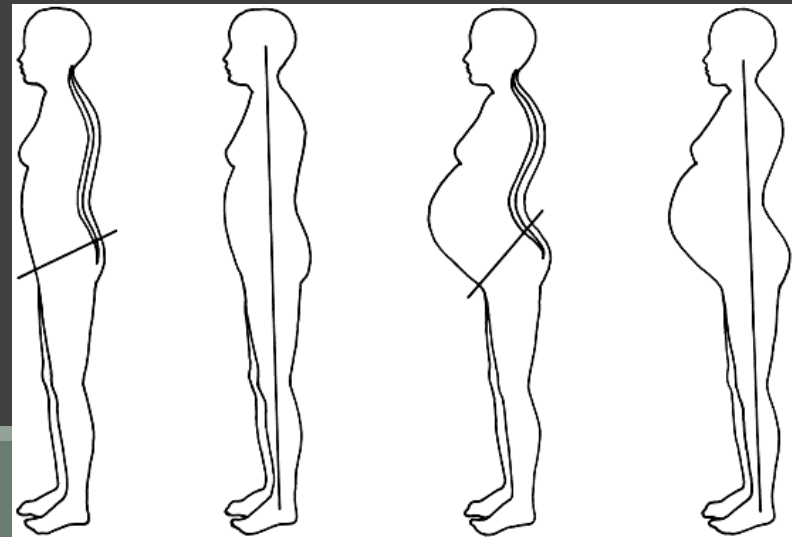
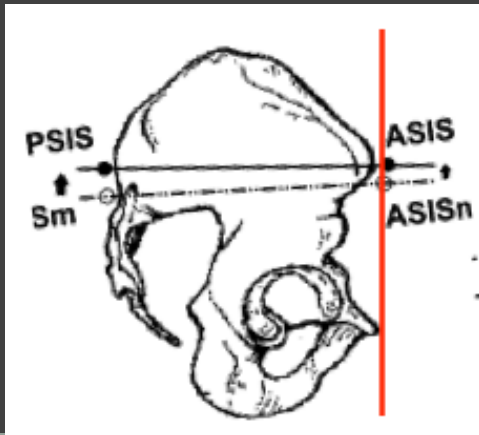
What to assess?

1. Posture – Increased Lordosis
2. Body Types/Mobility/ Hypermobility
3. General Full Body Movement – FMS
4. Endurance
5. Core control/Pelvic Floor
6. Muscle balance
7. Co-Morbidities
8. KNOW WHEN TO REFER



Posture

1. Lordosis more common in females when standing
2. Different shaped pelvis
3. Lining ASIS with PSIS doesn't work with gynaecoid pelvis
4. Increasing Lordosis with subsequent pregnancies
5. Different peak in back curve – ribcage positioning important



DO BODY TYPES EXIST?

- The anatomic and physiological differences re physical ability considered hard to verify (Malousarisa & et al.2008).
- However, somatotype and physical fitness factors seem to indicate that not all athletes will excel in all areas
 - Clients DO get different results
 - Everyone can look awesome!
- Can you alter fat *distribution pattern* via diet and exercise?

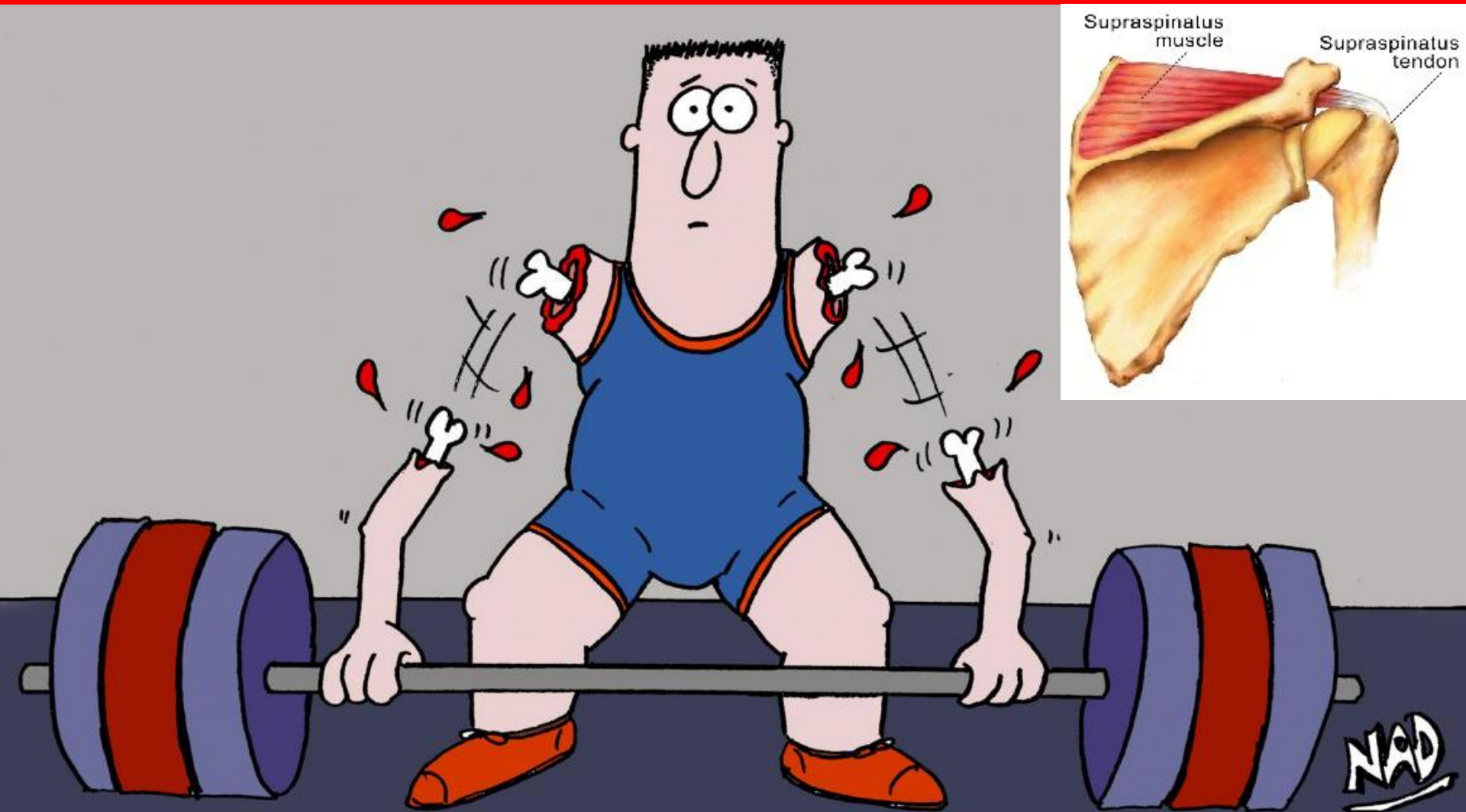


What we do know

1. Power athletes have short arms
2. Throwing athletes have longer arms
3. Distance runners have light tibia, higher calves
3. Pear and apple shape *DO* exist
4. **HOWEVER** there is no such thing as a **NON - RESPONDER**
(Churchward-Venne 2015)



HYPERMOBILITY: ASSESS SHOULDER

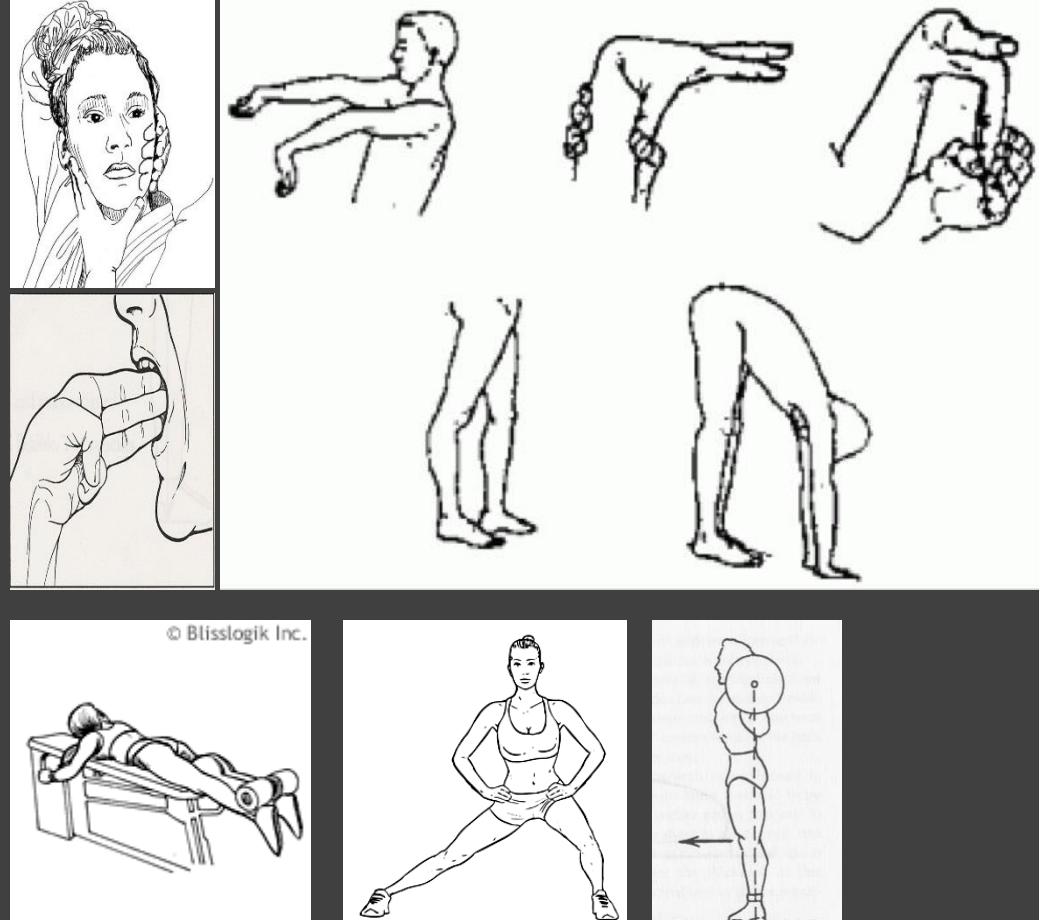


Body Type:

Hypermobility ~3:1 females to males

CONSIDERATIONS:

1. Dumbbells
2. Barbells
3. Push ups
4. Grip strength
5. Prone leg curl machine
6. Squats
7. Lateral Lunges
8. More knee valgus



How much warm-up of ROM?

1. It's really common to see women static squatting for 3-4 mins prior to lifting
2. Be client specific
3. Avoid greater than normal ROM (find out normal)
4. Assess their cold ROM
5. Warm up set with light load may benefit more than DROM – muscle activation rather than focus on loosening



FMS – Functional Mmt. Screen

1. FMS total score maybe a predictor of injury risk in females
2. Score less than 17 = increased injury
3. Young women score lower than young men
4. Other factors also useful (10m sprint/ body composition/ CV fitness, training age)

(Anderson 2015)



Lefateker , Anderson et al



Maybe Thomas test
could be added.

Assess Endurance/Core control?

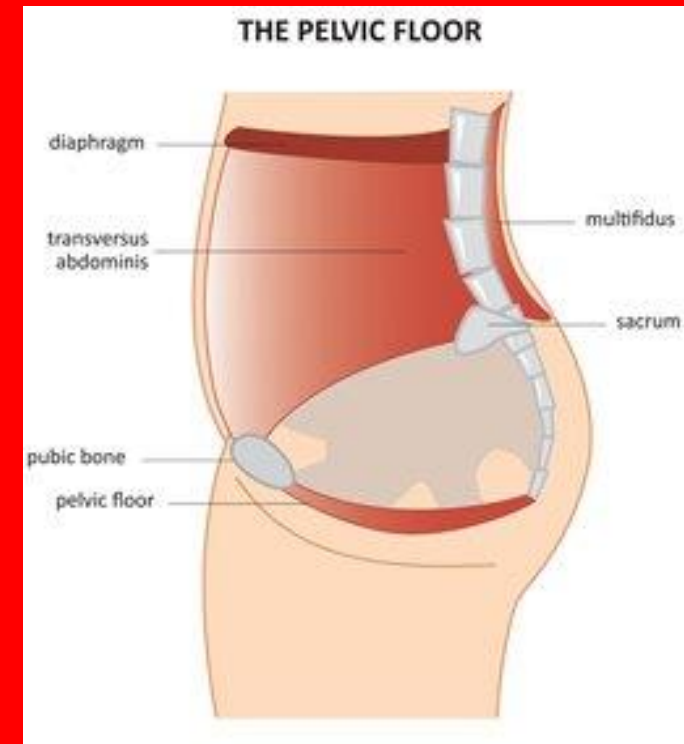
1. Endurance may influence starting volume
2. Endurance capacity may influence recovery between sets
3. Endurance athletes perform more reps at given RM (Richens 2014)
4. Assess all movement technique in general to assess core control (Wirth et. al. 2016)
5. Pelvic floor – stress incontinence/urge incontinence - prior to heavy weight training

(Richens 2014)



Assess Pelvic Floor

1. Affects 10% and 55% between 15 and 64 years (100% over 4 babies)
2. The prevalence during sports among young, nulliparous athletes varies between 0% (golf) and 80% (trampolinists)
3. Pelvic floor – stress incontinence / urge incontinence assess especially prior to heavy weight training
4. Volume as little as 3 sets of 8–12 close to maximum contractions, 3–4 times a week may be enough

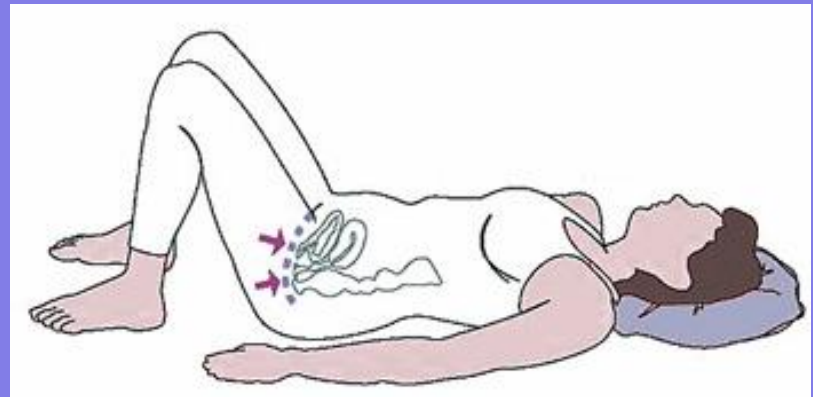


PELVIC FLOOR TRAINING - refer

It seems impossible to voluntarily pre-contract the PFM before and during every increase in abdominal pressure while participating in sport and leisure activities.

Therefore, strengthen the PFM specifically and then the muscle should contract automatically.

(Mørkved et. al. 2014)



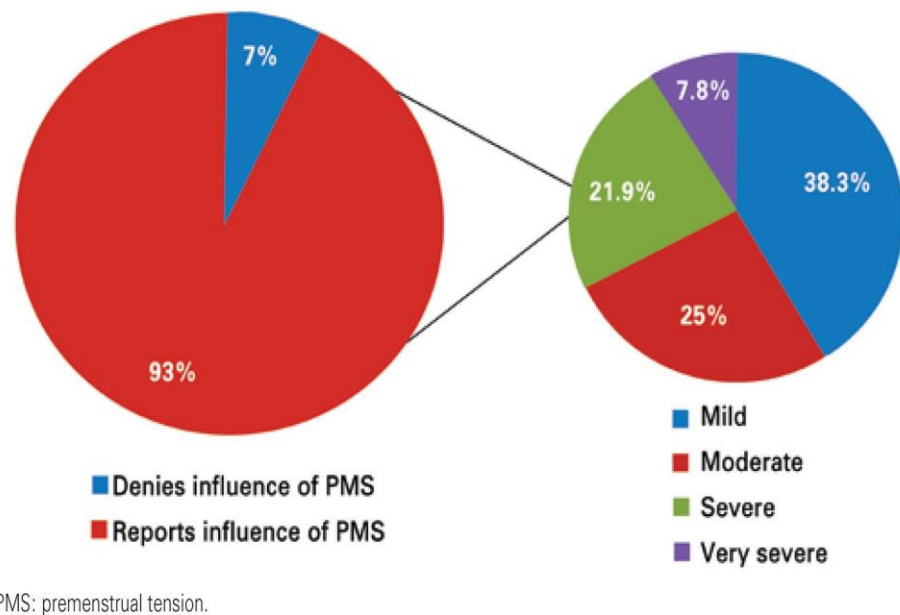
Menstrual Cycle

1. PMS
2. Training around menstruation

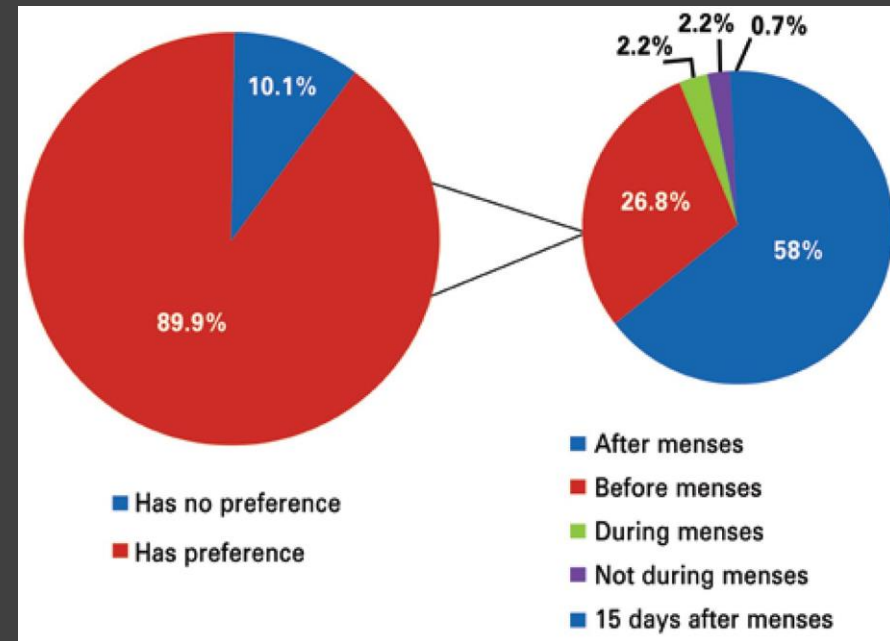
Women who exercise regularly have less intense or fewer PMS symptoms.

Magnesium, linoleic acid, vitamin B5, B6, zinc, vitamin C, and vitamin B3

(Samadi et. al. 2014)



(Parmigiano et. al. 2014)

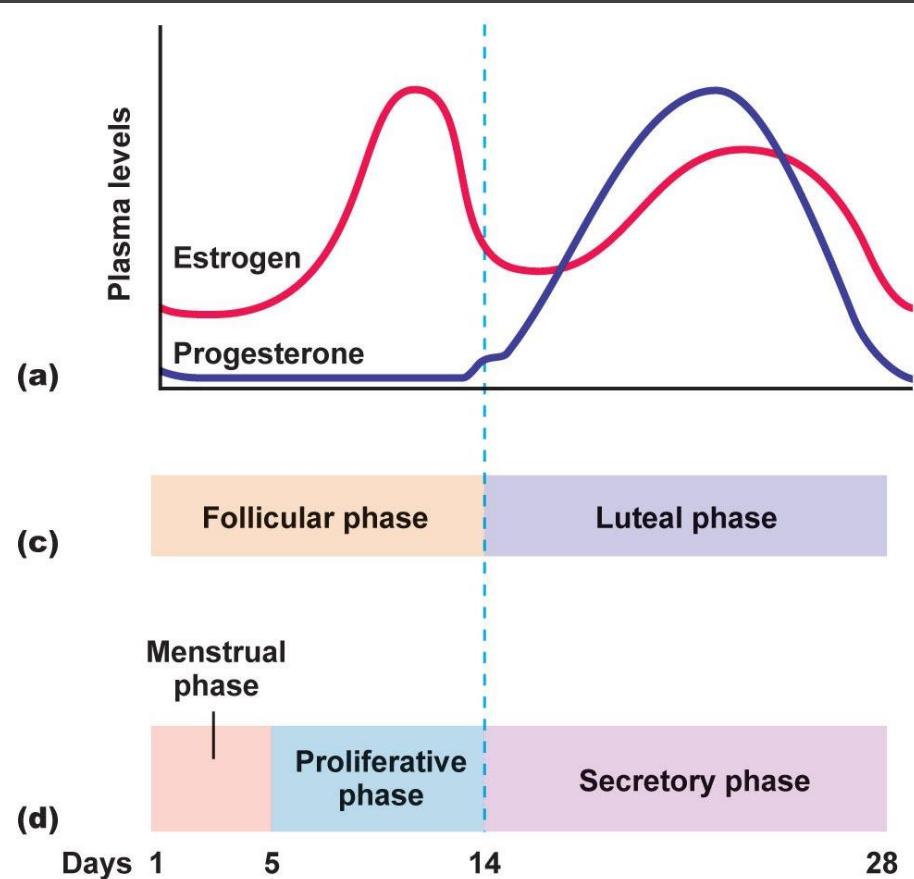


Menstrual Cycle

Eumenorrheic (normal) athletes not taking oral contraception should base the periodization of their strength training on their individual MC.

Increase intensity/volume during Follicular phase – i.e. first 2 weeks of cycle

(Sung et. Al. 2014)



Age Variations

Teenager

- ACSM 2014 guidelines
- Bone density
- Motor control
- Teach movement
- Fun



"I do weights for muscle health, cardio for heart health and chocolate for mental health."

Post Natal

- Get trained
- 6/12 weeks (medical)
- 2 years
- PF screen
- Breast feeding

Older

- Increase warm-up
- Increase mobility
- Increase volume with sets before increasing load
- Can train heavy with osteoporosis

(Watson 2015)









Foundations

Goals, history

Assessment

1. Posture
2. Single-leg deadlift
3. Single-leg squats
4. Single-leg jumping: forward, backward off a step
5. Push-up hold variations
6. Single-arm pressing and pulling

Weight Training Programming

Organizing the Training Session

Paired sets & supersets;

Giant sets;

Circuits;

Pair unilateral with unilateral, bilateral with bilateral

25-40 sets per workout (350-500 reps)

Programming Splits

Always goal and preference oriented (as long as not imbalanced);

Total body;

Lower limb oriented;

Upper body almost always: vertical push/pull, horizontal push/pull

Balanced core work: lateral, anterior, posterior, rotational;

Little direct arms, forearms

Total Body Splits

Hip dominant

Horizontal push + pull

Core

Knee dominant

Vertical push + pull

Core

Lower Body Sequencing

Unconventional – ankle & knee stabilizers then perform hip stability work;

Prime mover paired with primer mover;

Prime mover paired with antagonist;

Stability before or after prime movers;

Core often first or part of the circuit.

Training Methods

Contrast Reps

Goblet squat, 8 reps

Rest 10 seconds

Leg presses, 25 reps

Training Methods

Contrast Speed

Deadlift with a 8 second lowering speed

Rest 10 seconds

KB swings

Training Methods

Contrast Muscle Action

Front dumbbell step-ups, 15 reps

Rest 10 seconds

Single-leg squat wall hold, 45 seconds

Training Methods

Drop sets (all kinds)

Leg presses

10+10+10

10+15+20

20+15+10

Training Methods

Range of Motion Methods

11/4 method

Double 11/4 method

21s variations

Paused methods, 3x3

Training Methods

Mixed Methods

Bulgarian squats, 8 reps using the 3x3 paused method

Single-leg hack squats using 21s

Single-leg leg extensions, 15 rep using the 11/4 method

Single-leg wall squat holds, 30 seconds

Single-leg leg extensions, 25 reps

Training Methods

Mixed Methods

Lying leg curls, 6+8+12 drop set

Swiss ball leg curls, 30 reps

Nordic leg curls, 8 reps with 8s lowering

GHR, 8 reps, using 3x3 method

Horizontal back extensions, 25 reps

Training Methods

Mixed Methods

Low cable thigh abductions, 15 reps using the 11/4 method

Back supported single-leg hip extensions, 15 reps using the double 11/4 method

45-degree single-leg back extensions, 21s

Single-leg hip extension, foot supported on bench, 25 reps

Training Methods

Mixed Methods

Calf raise, 15+15+15 drop set

Leg extensions + Leg curls, 15 reps using the 11/4 method

Single-leg contralateral KB RDL + Bulgarian squats, 15 reps

Single-leg barbell deadlifts + Single-leg squats, 15 reps

Cardiovascular Training

Continuous Aerobic Training

Two to four sessions a week

In the fasted state

Intensity 180-age

Cardiovascular Training

High-Intensity Interval Training

Alternate

Sprint-Interval Training

Continuous High-Intensity Interval Training

Intermittent High-Intensity Interval raining

Cardiovascular Training

Sprint-Interval Training

30 seconds 'all-out' with 4.5 minutes rest

Repeat 4-6 times

20 seconds 'all-out' with 2:10 minutes rest

Repeat 4-6 times

Cardiovascular Training

Continuous High-Interval Training

60 seconds HARD with 60 seconds EASY

Repeat 10 times

3 minutes HARD with 2 minutes EASY

Repeat 4-6 times

Cardiovascular Training

Intermittent High-Interval Training

30 seconds HARD with 30 seconds EASY

Repeat 8 times, 2 minutes EASY, repeat 3 times

20 seconds HARD with 40 seconds EASY

Repeat 8 times, 2 minutes EASY, repeat 3 times

FILEX 2017

STRENGTH TRAINING WOMEN

Tony Boutagy & Claire Norgate



WE ARE ALL WONDERWOMEN!



Author	Period and weekly frequency	Training volume and intensity	Main results
Häkkinen and Häkkinen [63]	12 wk; 2 times/wk	2–5 sets, 3 – 15 repetitions, 30 – 80% of 1RM. Slow and explosive muscle contractions.	↑PT (20%);↑EMG VL, VM and RF (~20%);↑CSA QF (9%).
Häkkinen et al. [67]	12 wk; 2 times/wk	2–6 sets, 8–15 repetitions (40–90% of 1RM) unilateral (UNI) and bilateral (BIL). Slow and explosive muscle contractions.	↑1RM (13–19%);↑EMG (9–19%);↑CSA QF (11–14%).
Häkkinen et al. [60]	24 wk; 2 times/wk	2–5 sets, 3 – 15 repetitions, 30 – 80% of 1RM. Slow and explosive muscle contractions.	↑1RM (21%);↑PT (36%);↑RFD (40%);↑SJ (24%);↑EMG VL and VM.
Kraemer et al. [62]	10 wk; 3 times/wk	Ondulatory periodization: 2–5 sets of 3–5RM; 8–10RM and 12 –15RM.	↑1RM (10%)*;↑CSA QF (6%).
Häkkinen et al. [64]	24 wk; 2 times/wk	2–5 sets, 3 – 15 repetitions, 30 – 80% of 1RM. Slow and explosive muscle contractions.	↑PT (16%);↑EMG VL and VM;↑CSA QF (8,5%);↑CSA fiber type I and II.
Häkkinen et al. [47]	10 wk; 2 times/wk	3–6 sets of 6–15 repetitions (50–80% of 1RM). Slow and explosive muscle contractions.	↑1RM (29%);↑EMG VL and VM; ↑SJ (22%);↑CSA QF (7%).
Häkkinen et al. [53]	24 wk; 2 times/wk	3–5 sets, 6 – 15 repetitions, 30 – 80% of 1RM. Slow and explosive muscle contractions.	↑PT (36%);↑EMG VL and VM;↑RFD (40%);↑1RM (21%).
Izquierdo et al. [19]	16 wk; 2 times/wk	2–5 sets, 3 – 15 repetitions, 50 – 80% of 1RM. Slow and explosive muscle contractions.	↑1RM (25–41%);↑PT (26%);↑ power at 20 – 80% of 1RM (15 –60%);↑CSA QF (11%)
Izquierdo et al. [3]	16 wk; 2 times/wk	3–4 sets, 10–15 repetitions, 50–80% of 1RM. Slow and explosive muscle contractions.	↑CSA QF (H%);↑maximal workload at cycle ergometer;↑load at 2 and 4mmol.L ⁻¹ at cycle ergometer;
Bottaro et al. [11]	10 wk; 2 times/wk	3 sets of 8–10 repetitions (40 – 60% of 1RM); Slow vs. explosive contractions (EC)	↑1RM (25%) in both 2 groups;↑power at 60% of 1RM, greater in EC (31 vs. 8%).
Cannon et al. [68]	10 wk; 2 times/wk	3 sets of 10 repetitions (50–75% of 1RM).	↑PT (18%);↑EMG VL and VM (21%);↑CSA QF (11%).
Slivka et al. [48]	12 wk; 3 times/wk	3 sets of 10 repetitions (70% of 1RM).	↑1RM (41%);↑CSA QF (2%).

1. Anderson, B. E., Neumann, M. L., & Bliven, K. C. H. (2015). Functional movement screen differences between male and female secondary school athletes. *The Journal of Strength & Conditioning Research*, 29(4), 1098-1106. Burrup, R. (2015). Strength Training and Body Composition in Middle-Age Women.
2. Bailey, J. F., Sparrey, C. J., Been, E., & Kramer, P. A. (2016). Morphological and postural sexual dimorphism of the lumbar spine facilitates greater lordosis in females. *Journal of anatomy*.
3. Cadore, E. L., Pinto, R. S., Bottaro, M., & Izquierdo, M. (2014). Strength and endurance training prescription in healthy and frail elderly. *Aging and disease*, 5(3), 183-195.
4. Churchward-Venne, T. A., Tieland, M., Verdijk, L. B., Leenders, M., Dirks, M. L., de Groot, L. C., & van Loon, L. J. (2015). There are no nonresponders to resistance-type exercise training in older men and women. *Journal of the American Medical Directors Association*, 16(5), 400-411.
5. Culvenor, A. G., Felson, D. T., Niu, J., Wirth, W., Sattler, M., Dannhauer, T., & Eckstein, F. (2016). Thigh muscle specific strength and the risk of incident knee osteoarthritis: The influence of sex and greater body mass index. *Arthritis Care & Research*.
6. Eklund, D., Schumann, M., Kraemer, W. J., Izquierdo, M., Taipale, R. S., & Häkkinen, K. (2016). Acute endocrine and force responses and long-term adaptations to same-session combined strength and endurance training in women. *The Journal of Strength & Conditioning Research*, 30(1), 164-175.
7. Farinatti, P. T., da Silva, N. S., & Monteiro, W. D. (2013). Influence of exercise order on the number of repetitions, oxygen uptake, and rate of perceived exertion during strength training in younger and older women. *The Journal of Strength & Conditioning Research*, 27(3), 776-785.
8. Grøntved, A., Pan, A., Mekary, R. A., Stampfer, M., Willett, W. C., Manson, J. E., & Hu, F. B. (2014). Muscle-strengthening and conditioning activities and risk of type 2 diabetes: a prospective study in two cohorts of US women. *PLoS Med*, 11(1), e1001587.
9. Hay, O., Dar, G., Abbas, J., Stein, D., May, H., Masharawi, Y., ... & HersHKovitz, I. (2015). The lumbar lordosis in males and females, revisited. *PloS one*, 10(8), e0133685.
10. Karinkanta, S., Kannus, P., Uusi-Rasi, K., Heinonen, A., & Sievänen, H. (2015). Combined resistance and balance-jumping exercise reduces older women's injurious falls and fractures: 5-year follow-up study. *Age and ageing*, afv064.
11. Kodesh, E., Shargal, E., Kislev-Cohen, R., Funk, S., Dorfman, L., Samuelli, G., ... & Sharvit, N. (2015). Examination of the effectiveness of predictors for musculoskeletal injuries in female soldiers. *Journal of sports science & medicine*, 14(3), 515.
12. Letafatkar, A., Hadadnezhad, M., Shojaedin, S., & Mohamadi, E. (2014). Relationship between functional movement screening score and history of injury. *International journal of sports physical therapy*, 9(1), 21.
13. Mann, S., Beedie, C., & Jimenez, A. (2014). Differential effects of aerobic exercise, resistance training and combined exercise modalities on cholesterol and the lipid profile: review, synthesis and recommendations. *Sports Medicine*, 44(2), 211-221.
14. Mayhew, J. L., Smith, A. E., Arabas, J. L., & Roberts, B. S. (2010). Upper-body strength gains from different modes of resistance training in women who are underweight and women who are obese. *The Journal of Strength & Conditioning Research*, 24(10), 2779-2784.
15. Mørkved, S., & Bø, K. (2014). Effect of pelvic floor muscle training during pregnancy and after childbirth on prevention and treatment of urinary incontinence: a systematic review. *British journal of sports medicine*, 48(4), 299-310.

1. Nikbakht, M. (2011). Relationships between somatotype, anthropometry and physical fitness variables in untrained university students. *Journal of Physical Education and Sport*, 11(2), 211.
2. Nunes, P. R. P., Barcelos, L. C., Oliveira, A. A., Júnior, R. F., Martins, F. M., Elizabete Ap MR, R., & Orsatti, F. L. (2017). Muscular strength adaptations and hormonal responses after two different multiple-set protocols of resistance training in postmenopausal women. *The Journal of Strength & Conditioning Research*.
3. Parmigiano, T. R., Zucchi, E. V. M., Araujo, M. P. D., Guindalini, C. S. C., Castro, R. D. A., Bella, Z. I. K. D. J., ... & Sartori, M. G. F. (2014). Pre-participation gynecological evaluation of female athletes: a new proposal. *Einstein (São Paulo)*, 12(4), 459-466.
4. Radaelli, R., Wilhelm, E. N., Botton, C. E., Rech, A., Bottaro, M., Brown, L. E., & Pinto, R. S. (2014). Effects of single vs. multiple-set short-term strength training in elderly women. *Age*, 36(6), 1-11.
5. Radaelli, R., Botton, C. E., Wilhelm, E. N., Bottaro, M., Lacerda, F., Gaya, A., ... & Pinto, R. S. (2013). Low-and high-volume strength training induces similar neuromuscular improvements in muscle quality in elderly women. *Experimental gerontology*, 48(8), 710-716.
6. Richens, B., & Cleather, D. J. (2014). The relationship between the number of repetitions performed at given intensities is different in endurance and strength trained athletes. *Biol Sport*, 31(2), 157-61.
7. Ribeiro, A., Schoenfeld, B., Souza, M., Tomeleri, C., Silva, A., & Teixeira, D. et al. (2017). Resistance training prescription with different load-management methods improves phase angle in older women. *European Journal Of Sport Science*, 1-9. <http://dx.doi.org/10.1080/17461391.2017.1310932>
8. RIBEIRO, V. B., KOGURE, G. S., REIS, R. M., GASTALDI, A. C., DE ARAÚJO, J. E., MAZON, J. H., ... & SOUZA, H. C. (2016). Polycystic Ovary Syndrome Presents Higher Sympathetic Cardiac Autonomic Modulation that is not altered by Strength Training. *International Journal of Exercise Science*, 9(5), 554.
9. Rustaden, A., Haakstad, L., Paulsen, G., & Bø, K. (2017). Effects of BodyPump and resistance training with and without a personal trainer on muscle strength and body composition in overweight and obese women—A randomised controlled trial. *Obesity Research & Clinical Practice*, pii: S1871-403X(17)30020-0. <http://dx.doi.org/10.1016/j.orcp.2017.03.003>
10. Samadi, Z., Valiani, M., & Taghian, F. (2014). Comparison the effects of two month exercise of pilates, aerobic and vitamin B6 intake on the symptoms of premenstrual-syndrome in sedentaryadult girls. *Iranian Journal of Reproductive Medicine*, 12(6), 48. Retrieved from <https://search-proquest-com.ezproxy.uws.edu.au/docview/1620443674?accountid=36155>
11. Santos, E., Rhea, M. R., Simão, R., Dias, I., de Salles, B. F., Novaes, J., ... & Bunker, D. J. (2010). Influence of moderately intense strength training on flexibility in sedentary young women. *The Journal of Strength & Conditioning Research*, 24(11), 3144-3149.
12. Strickland, J. C., & Smith, M. A. (2014). The anxiolytic effects of resistance exercise. *Frontiers in psychology*, 5, 753.
13. Sung, E., Han, A., Hinrichs, T., Vorgerd, M., Manchado, C., & Platen, P. (2014). Effects of follicular versus luteal phase-based strength training in young women. *Springerplus*, 3(1), 668.
14. Tinsley, G. M., Gann, J. J., Huber, S. R., Andre, T. L., La Bounty, P. M., Bowden, R. G., ... & Grandjean, P. W. (2017). Effects of fish oil supplementation on postresistance exercise muscle soreness. *Journal of dietary supplements*, 14(1), 89-100.
15. Walton, L. M., Asumbrado, R., Machamer, L., & Behrens, M. A. (2014). C-1 Nutrition, exercise type, exercise intensity and stress and predictive relationship with premenstrual symptoms.
16. Watson, S. L., Weeks, B. K., Weis, L. J., Horan, S. A., & Beck, B. R. (2015). Heavy resistance training is safe and improves bone, function, and stature in postmenopausal women with low to very low bone mass: novel early findings from the LIFTMOR trial. *Osteoporosis International*, 26(12), 2889-2894.
17. Wirth, K., Hartmann, H., Mickel, C., Szilvas, E., Keiner, M., & Sander, A. (2016). Core Stability in Athletes: A Critical Analysis of Current Guidelines. *Sports Medicine*, 1-14.