Comparing Periodization Strategies for Women

Research suggests weekly undulating periodization has some advantages over block periodization.


**How Does Undulating Periodization Compare with Linear Periodization?**

Linear periodization, which is similar to block periodization, begins with high volume and low intensity, and gradually progresses to lower volume and high intensity (Harries, Lubans & Callister 2015).

Linear periodization is often developed over a year with weekly microcycles, monthly mesocycles and multimonthly macrocycles. Harries, Lubans & Callister conducted a systematic review and meta-analysis of 17 studies (with adults) that compared undulating periodization and linear periodization. Sixteen of the 17 studies demonstrated significant increases in muscular strength with both approaches.

However, the analysis found no differences in the effectiveness of undulating vs. linear periodization for lower- and upper-body strength gains. Harries et al. suggest that personal trainers use both periodization approaches to present more variety and prevent stagnation in their clients.

**Benefits of Periodization**

Periodization means creating a systematic, structured weight-training plan that manipulates variables such as volume (repetitions and sets), intensity (resistance load), frequency (times per week) and rest (between sets and between workouts) over a specific training period.

Periodization programs are designed to produce maximum gains and reduce the risks of overtraining, which can lead to declining performance. Research suggests periodized training programs do a better job of developing muscular fitness than nonperiodized programs (Harries, Lubans & Callister 2015).

Two relatively new periodization programs for women are block periodization and weekly undulating periodization (Bartolomei et al. 2015). **Block periodization (BP)** is a Russia-developed program using phases of 2-6 weeks, with each phase targeting a specific training stimulus (e.g., strength, hypertrophy, power). Bartolomei et al. note that BP phases move progressively from hypertrophy to strength to power. In contrast, **weekly undulating (WUD) periodization** progresses from high volume and low intensity to low volume and high intensity over periods of several weeks—“mesocycles” in resistance training parlance (Bartolomei et al. 2015).

BP and WUD had never been scientifically compared in a female population, which inspired the researchers to conduct this study.

**Study Volunteers**

Bartolomei and colleagues recruited 17 recreationally trained women who had never used periodized training but had done resistance training (free weight and/or machine) at least once a week for the past 2 years. The women had also done at least one bout of squats each week within the past year. They were randomly assigned to two groups:

- **Block periodization (BP):** 9 women, average age 24.7 years, body weight 137 pounds and height 65.5 inches.
- **Weekly undulating periodization (WUD):** 8 women, average age 23.2 years, body weight 132 pounds and height 63 inches.
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**Resistance Training Protocols**

Before the study, the women spent 2 weeks learning how to perform all the exercises correctly. Then they worked out three times a week during the 10-week study. Everybody did the same exercises:

- **Monday:** squat, countermovement jump, bench press, military press, leg curl
- **Wednesday:** dead lift, prone barbell row, latissimus dorsi pull-down, preacher curl
- **Friday:** sumo dead lift, leg extension, incline bench press, barbell triceps extension and high pull (For the high pull, start by holding the barbell slightly wider than shoulder width with knees and hips flexed; explosively extend the
1-RM means one-repetition maximum (thus, 70% 1-RM means participants train at 70% of the 1-RM for each exercise).

This block periodization program uses two 5-week mesocycles. The first 5-week mesocycle is the high-volume, lower-intensity block. It focuses on muscle hypertrophy using 5 sets of each exercise with a 1-minute rest between sets. The second 5-week mesocycle targets maximal strength training with 5 sets and a 3-minute rest between sets. Transitions at the 5th and 10th weeks have lighter training intensity and volume, with a 2-minute rest between sets.

This WUD program has two 5-week mesocycles. The first week of each mesocycle targets a muscle hypertrophy stimulus. The second week of training in both mesocycles has a slight increase in intensity and a decrease in repetitions. The third and fourth weeks of each mesocycle focus on maximal strength, with participants working at a higher intensity and a lower volume.
COMPARING PERIODIZATION STRATEGIES IN WOMEN

A 2015 study of 17 women contrasted the results of weekly undulating periodization (WUD) and block periodization (BP) in 10 weeks.

<table>
<thead>
<tr>
<th>BODY CHANGES</th>
<th>WUD</th>
<th>BP</th>
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<tbody>
<tr>
<td>fat mass</td>
<td>-7.0%</td>
<td>-4.0%</td>
</tr>
<tr>
<td>lower-body strength</td>
<td>+27.7%</td>
<td>+15.2%</td>
</tr>
<tr>
<td>arm circumference</td>
<td>+15.1%</td>
<td>+11.2%</td>
</tr>
<tr>
<td>thigh circumference</td>
<td>+5.8%</td>
<td>+1.6%</td>
</tr>
</tbody>
</table>

Source: Bartolomei et al. 2015.

hips and knees while pulling the bar up to chest level.)

Figures 1 and 2 outline the BP and WUD designs used in the study (the programs did not include dietary interventions). Volunteers were instructed not to do any other type of training or play any sports during the study.

Before-and-After Assessments

The study measured strength two ways: 1-RM tests (the most weight a person can lift once) of squats, dead lifts and bench presses; and maximal isometric mid-thigh pull strength using an isometric dynamometer, which measures force. Arm and thigh circumference measurements documented changes in body composition. Percent of body fat was also measured.

Study Results

Neither group showed any change in body weight from 10 weeks of training. However, fat mass decreased by 4% in the BP group and 7% in the WUD group (remember, the study had no dietary intervention). After 10 weeks of training, both the BP and WUD groups showed similar and significant increases in strength and power. However, the WUD group showed significantly better improvement (+27.7%) in lower-body strength than the BP group (+15.2%). Both groups significantly increased arm muscle circumference, with the WUD group up 15.1% and the BP group up 11.2%.

Additionally, thigh circumference grew significantly more in the WUD group (+5.8%) than the BP group (+1.6%). It is interesting to note that the arms showed a greater change (in both groups) than the legs. Bartolomei et al. (2015) suggest the contrasting changes between upper body and lower body may have been due to the complexity of the lower-body exercises. However, since both the upper body and lower body were trained at the same relative intensities, this difference may be more a result of a variance in time adaptation of the upper- and lower-body musculature in women. This interesting finding warrants further investigation.

Bottom-Line Message for Trainers

The WUD group had greater lower-body strength gains, bigger increases in thigh and arm circumferences, and more significant changes in fat mass. This suggests that for recreationally trained women, early adaptations (up to 10 weeks) appear more responsive to the WUD training protocol.

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Additional References
