Program Design Considerations for the Female Athlete

Coach-Athlete Relationships

The strength and conditioning coach may find that many female athletes are inexperienced with weight training and feel uncertain about their abilities. The coach should bear in mind that athletes become more confident about new or frightening tasks when they watch a live demonstrator and then practice the task step-by-step. Using this participant-model technique (5, 6, 38, 99) in the weightroom can help novice lifters succeed. For example, lifts can be presented progressively from simpler presses and squats to the more complex cleans and snatches. Complex lifts can be learned in a step-by-step approach. More easily attainable weights should precede those that are challenging.

It is especially heartening for novices to observe their peers as they struggle and succeed. This underscores the need to use female athletes and coaches as role models in the weightroom. The initial impact of skilled female strength and conditioning coaches on the degree of interest and participation in weight training appears to be positive (136). The development of qualified female strength and conditioning specialists may be the surest means of convincing female athletes that strength training is rewarding and appropriate for women.

This expression of hope for the future is by no means intended to detract from the effective and sympathetic working relationships many male coaches have with female athletes. A male coach who must work in a less than perfect reality should find it helpful to point out the more experienced female athletes as role models for novice females. Moreover, research summarized by Green-dorfer (55) shows that male athletes are also important role models for developing female athletes, a fact that supports the maintenance of coeducational weightrooms. The ideal would be to develop a coeducational coaching staff capable of flexibly teaching same gender or opposite gender athletes. This would do much to promote the concept that strength training is an activity to be performed by athletes regardless of their gender.

Additionally, high expectations by a coach about an athlete generate better performance. Low expectations have the opposite effect (35, 100). Such expectations can be communicated by both verbal and non-verbal cues. Both male and female strength and conditioning coaches who work with female athletes need to examine their own learned belief systems regarding strength, particularly their own personal sense of limitations. The coach can facilitate this process of self-examination by conducting an orientation session for novice lifters in which these beliefs and those of the athletes can be sympathetically discussed and in which reasonable goals for the athletes can be set.

Training Methodologies

The research to date indicates that resistance training is at least as beneficial to women as it is to men, if not more so. Not only can women become much stronger from resistance training, but their relative increases in lean body mass and decreases in percent body fat are equivalent to those of males engaged in a similar short-term program (41).

As Fleck and Kraemer point out in Designing Resistance Training Programs, “Female muscle has the same physiological characteristics as male muscle and, therefore, responds to training in the same fashion... The belief that women will become excessively hypertrophied, that their resistance training programs must be different from those of men and that resistance training will leave them musclebound are unfounded” (41).

Training programs for female athletes should be organized around the sound principles of training as used by their male counterparts. Those unfamiliar with training procedures should also refer to references 10, 41, 46, 127 and 135. The following is a list of recommendations for designing training programs for female athletes:

1. The committee recommends that female athletes be exposed to resistance training methods in junior high and high school.

2. It is vital that strength and conditioning personnel be sensitive to the individual needs of the female athlete (in particular, problems with the menstrual cycle). For example, empirical evidence suggests that athletes score best on strength tests two to three days after the onset of menstruation.

3. Interviews with several collegiate
strength and conditioning coaches (28) suggest that the strength levels of female athletes diminish more quickly than those of their male counterparts. During the competitive season, in order to maintain strength levels, some coaches recommend that female athletes continue to have weight training sessions using 80 to 90 percent loadings. In a week when no competition is scheduled, for instance, two 90 percent workouts and one 60 percent workout might be scheduled. In a competitive week, one 90 percent and one 60 percent workout might be scheduled. This is a valid and workable way of maintaining the strength levels of a female athlete.

4. Perhaps because of social stigmas, the arousal with which female athletes approach weight training tends to be much lower than that of males. Strength and conditioning staff members should explain to their female athletes the concept of specificity of training and encourage them to approach their exercises with appropriate arousal. When a high degree of aggression and arousal is called for (maximum attempts), every effort should be made by the strength and conditioning staff members to elicit the proper arousal.

5. More multi-joint exercises need to be introduced to the female athlete earlier in her exposure to weight training. Too many women are first introduced to machine training as the "safest" way for females to train.

6. Female athletes are capable of handling both a higher volume and a higher intensity of resistance training than was thought possible just five years ago. High standards for performance need to be set, and training records kept on each athlete so that volume and intensity can be monitored for each training cycle and on a yearly basis.

7. Although females should be encouraged to strengthen the entire body, particular attention needs to be paid to the upper body in general and the triceps and low back in particular.

8. Because of body weight increases during the menstrual cycle, plyometric exercises (jumping drills) must be monitored closely in terms of volume and intensity.

**Summary and Recommendations**

It appears that proper strength and conditioning exercise programs may increase athletic performance, improve physiological function and reduce the risk of injuries. These effects are as beneficial to female athletes as they are to males. The question that has to be addressed is whether female athletes require different training modalities, programs or personnel than those required by male athletes.

Due to similar physiological responses, it appears that males and females should train for strength in the same basic way, employing similar methodologies, programs and types of exercises. Coaches should assess the needs of each athlete, male or female, individually, and train that athlete accordingly. Coaches should keep in mind that there may be more differences between individuals of the same gender than between males and females. Still, there may be psychological and/or physiological considerations that should be taken into account in training female athletes.

**Historical**

The dominant belief regarding women in the nineteenth century was that frailness and weakness was a
characteristic of femininity. There were a few reformers, particularly in the latter half of the century, who began to advocate vigorous exercise for women as a health restorative. Through the “systems” of early pioneers, many American women were exposed to Indian club and light weight training. In the 1950s, female athletes began employing weight training as part of their athletic preparation. The success of weight-trained male athletes and the passage of Title IX in 1972 provided the impetus for subsequent growth of weight training for female athletes.

Socio-psychological Considerations

1. Cultural and sociological stigmas may significantly affect the pursuit of strength training by females in Western societies. These stigmas are manifested by concerns about femininity, appearance, aggression, self-esteem, self-concept and appropriateness of behavior.

2. The learned belief systems of females differ significantly from those of males in Western societies in regard to physical expressions and body image. These belief systems can affect training intensities and maximum expressions of strength (76).

3. Despite a degree of social stigma, females who participate in strength-power conditioning programs have good feelings about themselves. This may be due to the positive impact strength training has on self-concept.

4. Female role models in the weightroom may play an essential part in the initial adjustment to training and in the long-term success of female athletes’ strength training programs. Female role models appear to be especially important during adolescence and young adulthood. The support and example of male athletes are also important in the development of female athletes. Therefore, coeducational coaching staffs for strength and conditioning, as well as coeducational weightrooms, can greatly aid in providing the communication and role models necessary to make strength training accepted as positive, rewarding and appropriate for females.

5. Strength and conditioning personnel, both male and female, need to examine their own belief systems regarding strength training of females. These personnel, through verbal and nonverbal cues, may communicate lesser expectations to female athletes than they do to males. As a result, groundless fears about strength training for females are perpetuated, and the female athlete may be inhibited from reaching her genetic potential.

Physiological Considerations

1. Data at this time suggest that in untrained individuals, the absolute total body strength of females is approximately two-thirds that of males, although this difference is not consistent for all muscle groups. Absolute lower body strength ranges from 60 to 80 percent that of males, and absolute upper body strength from 35 to 79 percent that of males. It should be noted that these differences are based on studies involving non-athletic subjects; the studies primarily involved tests of static strength. Studies assessing the relative and absolute strength of highly trained female athletes are needed. Strength differences in the studies to date are largely attributable to the greater body size of males and their higher lean body mass to fat ratio.

2. When the gender differences in body size and lean body mass are taken into consideration, relative strength differences are considerably less appreciable. In the lower body, in fact, the relative strength (strength to lean body mass) of untrained women appears to be approximately equal to that of males. Researchers who have examined the ability to generate force per unit of cross-sectional muscle have found no significant gender differences.

3. The role of the hormone testosterone in strength expression is not clearly understood at this time. Although it is known that the rate of secretion for males is 5 to 10 mg/day and less than 0.1 mg/day for females, studies have yet to demonstrate that higher testosterone levels alone (in either males or females) correlate with greater strength values. Both empirical and some objective evidence suggests, however, that the exogenous administration of testosterone does positively affect strength expression in both males and females who practice weight training.

4. Little statistical evidence is available to document the existence of anabolic steroid use by female athletes. (Anabolic steroids are synthetic derivatives of the male hormone testosterone.) Because success in many competitive sports results in part from greater physical size and strength, however, the temptation for females to use anabolic steroids appears to be as great as for males. Furthermore, there is a growing body of anecdotal evidence that suggests that a large number of women athletes have already experimented with these drugs. Strength and conditioning coaches should help athletes pursue excellence through improved training methods and nutritional counseling. This approach should help coaching staffs avoid endangering the health of women athletes or compromising the ethics of sport.

5. Short-term studies and empirical evidence to date have shown that females hypertrophy as a consequence of resistance exercise. The relative degree of hypertrophy as a result of resistance training is equal to that of males, although the absolute degree is smaller. The genetic predisposition to hypertrophy and/or exogenous androgen use most likely play significant roles in determining the degree of hypertrophy achieved.

6. Female athletes appear to have similar fiber-type distributions to their male counterparts, although the fibers of females appear to be smaller in cross-sectional area. Whether this is genetically determined or training-induced is not clear at this time. Heavy resistance training has been demonstrated to increase fiber cross-sectional area, with corresponding in-
creases in strength and power.

7. There is little research evidence that suggests the onset of a normal menstrual period affects athletic performance. There is tremendous variability, however, in the physical and psychological ways in which women respond to their menses (114, 149). If circumstances permit individualized strength programs, the monthly onset of menstruation should be considered during program design. It is to be hoped that discussions of the menstrual cycle will be handled with tact and sensitivity by strength and conditioning personnel. Athletes who experience extreme difficulty before and/or during menstruation should seek advice from their gynecologists regarding proper medical intervention.

8. Irregular menstrual cycles (oligomenorrhea) and/or the cessation of the periods (amenorrhea) may pose health risks to female athletes (16, 109). Amenorrheic athletes have an increased likelihood of developing musculoskeletal injuries (especially stress fractures and osteoporotic fractures) due to the weakening of the bones from reduced estrogen levels. It is strongly urged that all athletes experiencing amenorrhea or other menstrual irregularities consult a gynecologist. Proper nutritional intakes (e.g., calcium, iron) also must be evaluated. Finally, resistance training utilizing multi-joint and structural exercises is recommended to induce sufficient stresses on the skeletal system and to enhance calcium storage in the bone.

9. Little data exist at this time regarding weight training and pregnancy. Anecdotal evidence suggests, however, that women may safely weight train during pregnancy. Of course, common sense should be employed when selecting training intensities, exercises and loads during critical stages of pregnancy. Due to the influx of the hormone relaxin, which softens the tendons and ligaments in preparation for delivery, caution is warranted in performing heavy multi-joint free weight exercises (e.g., squats, deadlifts, snatches and cleans) after the first trimester. Also, the potential for hyperthermia (increase in body temperature) in pregnant women warrants the use of precautions in dress and environmental conditions during all types of exercise. Following childbirth, many women have returned to successful athletic careers. For additional data and recommendations on exercise and pregnancy, see references 3, 4, 20, 25, 39, 48, 53, 73, 86, 94, 95, 96, 102, 105, 116, 119, 123 and 144.

10. Some have raised the question of whether the relatively narrow shoulder width of females may pose problems in certain overhead lifts. Thus far, no data has been found to substantiate this concern. Coaches should pay close attention to hand spacing and to the carrying angle at the elbow. In the lower body, the greater pelvic width and the Q-angle (quadriiceps angle) of the knee may pose problems for female weight trainers. The Q-angle is the angle formed between the longitudinal axis of the femur that represents the pull of the quadriceps muscles and a line that represents the patellar ligament.

Again, although this has been raised as a point of concern, no data at this time support it. Coaches who are concerned about this condition may wish to caution female weight trainers with large Q-angles to squat with a toe-forward stance. Development of quadriceps strength can act as a strong deterrent of injuries in female athletes.

11. Considerable variation in body fat percent occurs between athletes of different sports. Although these values may be used as guidelines, it is important to understand that the performance and health of the individual must be carefully considered before attempting to alter body composition. Furthermore, athletes and coaches need to be aware of societal norms regarding body image and the implications this has for the development of eating disorders. Finally, resistance training has demonstrated favorable changes in body composition with minimal change in body weight.

12. Proper nutrition is an important consideration in strength training for female athletes. Because of the complexity of this topic, however, it is beyond the scope of this paper.

Other Considerations

Because females are, in general, weaker than males in their upper bodies, adult females should be urged to work especially hard on upper body strength training. Prepubescent females should be encouraged to participate in activities that will facilitate the development of upper body strength (tree climbing, gymnastics, rope climbing).

A major concern is the relatively small body of scientific literature concerning strength training that is applicable to the training of competitive female athletes. In many investigations, the training protocols have differed significantly from the actual methods used by the female athletes. More research involving female athletes is needed, utilizing more aggressive and modern training programs.

References


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