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Strength and conditioning practices among NCAA place-kickers

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Abstract

The purpose of this study was to examine the strength and conditioning practices of NCAA Division I and II starting place-kickers. The hope is that this information will be valuable to football coaches and strength and conditioning professionals who oversee the offseason regiments of kickers. The researchers investigated the strength and conditioning practices over nine different categories of exercises. The instrumentation used was a questionnaire, and the subjects were fifteen starting NCAA place-kickers at the Division I and II levels. The questionnaire format was divided into nine sections, and respondents were asked to indicate any exercise from a list that the athlete performs regularly during off-season training. The findings from this research study show that there are a few exercise categories that seem to be used more frequently than others and that certain exercises provide greater benefits to a place-kicker's performance. One hundred percent of respondents reported that they utilize the following exercise categories: core strength and endurance, assistance strength and endurance, power lifts, speed and agility, and flexibility, however, for place-kickers, flexibility and plyometric exercises seem to be the most beneficial for this specific type of athlete. This is most likely due to their need for explosive strength and power, as well as improved range of motion during the kicking range of movement.

Keywords: Flexibility, endurance, plyometrics, power, aerobic, strength, core

Introduction

Definition of Terms

Place-kicking is a manipulative, striking skill in which the foot is used to give impetus to a football that is placed on the ground or on a tee. Soccer-style is a method of place-kicking in which the kicker approaches the ball from an angle and uses the instep of the foot to strike the ball. The instep is the arched, medial portion of the foot. Core strength and endurance exercises are those which recruit one or more large muscle areas (i.e. chest, shoulder, back, hip or thigh) and often involve more than one major joint. Examples include the back squat, bench press, and seated row. Assistance strength and endurance exercises usually recruit smaller muscle areas (i.e. biceps, triceps, calves, and forearms) and involve only one primary joint. Examples include tricep extensions, bicep curls, wrist curls, and calf raises. Power lifts are core exercises that are performed explosively, rather than under slow control. The goal of power lifts is to develop muscular power. Examples include the snatch, clean, and jerk. Plyometric exercises are used to develop explosive strength and power by using light resistance or simply the athlete's own body weight. Examples include jumping, bounding, medicine ball exercises, and sport-specific movements. Speed and agility exercises are those which require the athlete to move at high velocities and/or require the athlete to explosively move, stop, and change directions rapidly. Examples include field sprints, shuttle runs, and resisted sprints. Aerobic exercises are those that are used to train an athlete's cardiorespiratory endurance. Examples include jogging, cycling, and swimming. Flexibility exercises are those which improve an athlete's range of motion at individual joints of the body. Examples include static, dynamic, ballistic and proprioceptive neuromuscular facilitative (PNF) stretches. Balance and stability exercises are those which primarily train the stabilizing muscles involved in achieving equilibrium and coordination. Examples include stability board exercises, balance beam exercises and stability ball exercises (Baechle, 2015) [1].

Methods

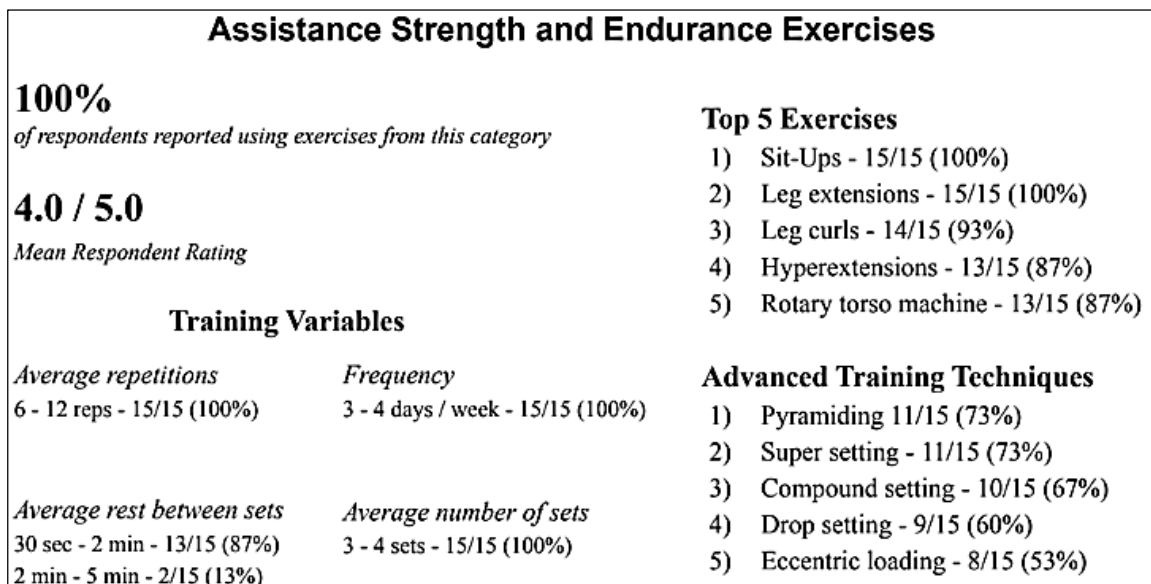
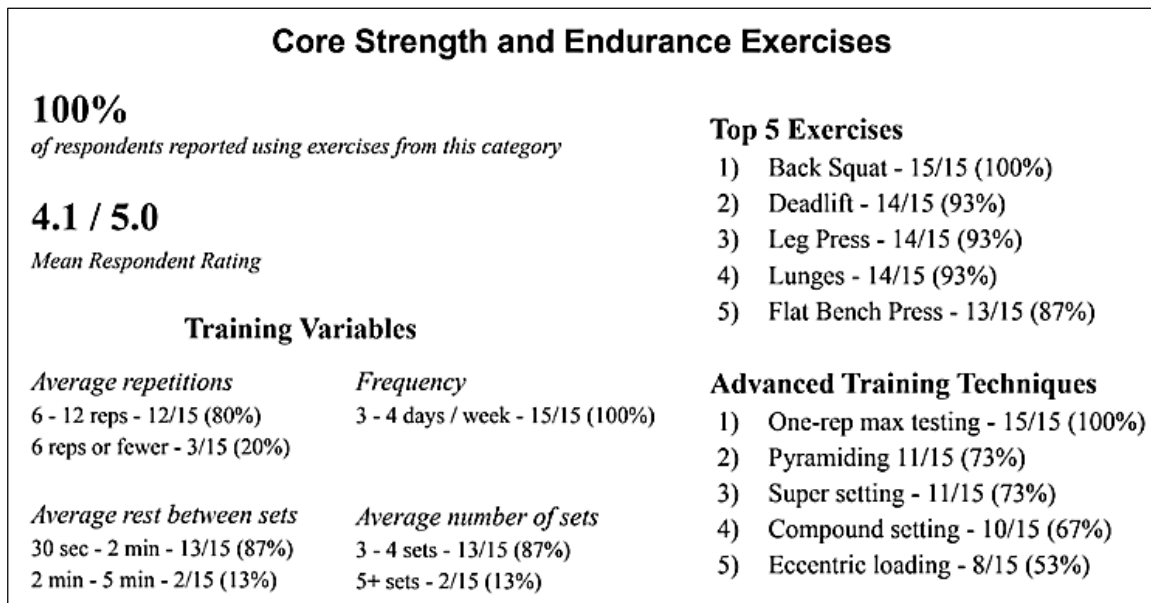
The researchers investigated the strength and conditioning practices over nine different categories of exercises:

1. Core strength and endurance exercises.
2. Assistance strength and endurance exercises.
3. Plyometrics.
4. Speed and agility exercises.
5. Power lifts.
6. Cardiorespiratory exercises.
7. Flexibility exercises.
8. Balance and stability exercises.
9. Other exercises.

The subjects were fifteen starting NCAA place-kickers at the Division I and II levels. The questionnaire format was

divided into nine sections, and respondents were asked to indicate any exercise from a list that the athlete performs regularly during off-season training. Next, the respondents were asked to rate the perceived importance of each exercise to the athlete's overall kicking performance. The rating scale was as follows: 0-not important, 1-minimally important, 2-somewhat important, 3-important, 4-very important and 5-extremely important. In addition, respondents were asked to list and rate any other exercises that were not listed in the questionnaire for each category. At the end of each section of the questionnaire, the athletes were asked to answer a few questions relating to training variables used for each category.

Results



Power Lifts

100%

of respondents reported using exercises from this category

4.5 / 5.0

Mean Respondent Rating

Training Variables

Average repetitions

6 - 12 reps - 3/15 (20%)

6 reps or less - 12/15 (80%)

Frequency

1 - 2 days / week - 1/15 (7%)

3 - 4 days / week - 14/15 (93%)

Average rest between sets

30 sec - 2 min - 6/15 (40%)

2 min - 5 min - 9/15 (60%)

Average number of sets

3 - 4 sets - 3/15 (20%)

5+ sets - 12/15 (80%)

Top 5 Exercises

- 1) Power clean - 15/15 (100%)
- 2) Hang clean - 14/15 (93%)
- 3) Snatch - 13/15 (87%)
- 4) Push press - 12/15 (80%)
- 5) Speed deadlifts - 7/15 (47%)

Advanced Training Techniques

- 1) Super setting - 11/15 (73%)
- 2) One-rep max testing - 10/15 (67%)

Plyometric Exercises

87%

of respondents reported using exercises from this category

4.8 / 5.0

Mean Respondent Rating

Training Variables

Average repetitions

Varies widely per exercise

Frequency

1 - 2 days / week - 13/13 (100%)

Average rest between sets

30 sec - 2 min - 8/13 (62%)

2 min - 5 min - 5/13 (38%)

Average number of sets

3 - 4 sets - 13/13 (100%)

Top 5 Exercises

- 1) Bounding - 13/15 (87%)
- 2) Medicine ball throws - 13/15 (87%)
- 3) Multiple hops/jumps - 13/15 (87%)
- 4) Jump squats - 11/15 (73%)
- 5) High knees - 8/15 (53%)

Advanced Training Techniques

- 1) Circuit training - 5/13 (38%)

Aerobic Exercises

53%

of respondents reported using exercises from this category

3.5 / 5.0

Mean Respondent Rating

Training Variables

Average duration

10 minutes or less - 1/8 (12%)

20 minutes - 2/8 (25%)

30 minutes - 5/8 (63%)

Top 5 Exercises

- 1) Cycling - 8/15 (53%)
- 2) Running stadiums - 7/15 (47%)
- 3) Jogging - 6/15 (40%)
- 4) Swimming - 5/15 (33%)
- 5) Water run training - 2/15 (14%)

Advanced Training Techniques

- 1) Fartlek training - 2/8 (25%)

Speed and Agility Exercises

100%

of respondents reported using exercises from this category

4.6 / 5.0

Mean Respondent Rating

Training Variables

Average repetitions

Varies widely per exercise

Frequency

1 - 2 days / week - 9/15 (60%)

3 - 4 days / week - 5/15 (33%)

4+ days / week - 1/15 (7%)

Average rest between sets

Less than 30 sec - 1/15 (7%)

30 sec - 2 min - 9/15 (60%)

2 min - 5 min - 5/15 (33%)

Average number of sets

3 - 4 sets - 11/15 (73%)

5+ sets - 4/15 (27%)

Top 5 Exercises

- 1) Field sprints 0-40 yards - 15/15 (100%)
- 2) Field sprints 41+ yards - 14/15 (93%)
- 3) Resisted sprinting - 11/15 (73%)
- 4) Uphill sprinting - 10/15 (67%)
- 5) Downhill sprinting - 5/15 (33%)

Flexibility Exercises

100%

of respondents reported using exercises from this category

4.9 / 5.0

Mean Respondent Rating

Training Variables

Average duration

5 - 10 minutes - 5/15 (33%)

11 - 20 minutes - 5/15 (33%)

30+ minutes - 5/15 (33%)

Frequency

3 - 4 days / week - 8/15 (53%)

5+ days / week - 7/15 (47%)

Primary stretch

Dynamic - 10/15 (67%)

Static - 3/15 (20%)

Ballistic - 2/15 (13%)

Top 4 Exercises

- 1) Dynamic stretching - 15/15 (100%)
- 2) Static stretching - 15/15 (100%)
- 3) Ballistic stretching - 12/15 (80%)
- 4) PNF stretching - 9/15 (60%)

Balance and Stability Exercises

80%

of respondents reported using exercises from this category

4.3 / 5.0

Mean Respondent Rating

Training Variables

Average duration

< 10 minutes - 10/12 (83%)

11 - 20 minutes - 2/12 (17%)

30+ minutes - 5/15 (33%)

Average rest

Less than 30 secs - 3/12 (25%)

30 sec - 2 min - 9/12 (75%)

Frequency

1 - 2 days / week - 12/12 (100%)

Top 4 Exercises

- 1) Stability ball - 9/12 (75%)
- 2) Stability board - 8/12 (67%)
- 3) Stork stand - 5/12 (42%)
- 4) Balance beam - 3/12 (25%)

Advanced Training Techniques

- 1) Gymnastics - 2/12 (17%)

Other Exercises

17%

of respondents reported using exercises from this category

4.0 / 5.0

Mean Respondent Rating

Top 2 Exercises

- 1) Yoga - 1/2 (50%)
- 2) Martial arts - 1/2 (50%)

Discussion

There have been many studies on training techniques of soccer players. Ronnestad, R., Kvamme, H., Sunde, A., and Raastad, T. (2008) ^[6] demonstrated the positive effects of short-term plyometric training on various performance parameters of soccer players. There are many similarities of American football place-kicking and kicking in the sport of soccer. The Principle of Specificity would support that kicking any type of ball for maximal distance would rely more on muscular power over muscular strength and endurance. It would also support the need for flexibility, balance and core stability. Kicking a ball for maximal distance, however, is not very common in soccer. There have been studies showing the benefits of dynamic and ballistic stretching and the relationship to muscular power in athletes in general (Jaggers, J.R., *et al.*, (2008) ^[5]). One study by Taylor, K.L., *et al.*, (2009) ^[8] showed a negative effect of static stretching when combined with a sport-specific warm-up.

Despite all the information that has been published, no researchers have examined what elite American football place-kickers do in their strength and conditioning regimens. The physical requirements to kick a football are much different than those of any other position on a football team. Certified strength coaches have an understanding of basic principles of training, but they may often not understand the specific needs of a place-kicker. In addition, many football programs do not have a kicking coach, and even a kicking coach may not always be aware of up-to-date best practices for strength and conditioning of kickers. Their expertise is often in the biomechanics of the place-kick. Therefore, the researchers reached out to several college programs to discover what starting place-kickers are currently doing in their strength and conditioning programs. This information could be of value to coaches and other kickers as well.

Conclusions

The exercise categories that were reported most common for a place-kicker's offseason training regimen in the sample were core strength and endurance exercises (100%), assistance strength and endurance exercises (100%), power lifts (100%), speed and agility exercises (100%) and flexibility exercises (100%). The least common category was the aerobic exercise category (53%), containing exercises such as cycling, jogging, swimming, etc. The highest rated exercise categories were flexibility exercises (4.9/5.0) and plyometric exercises (4.8/5.0), with the lowest rating given to aerobic exercises (3.5/5.0).

Regarding specific training variables, core and assistance strength and endurance exercises were most commonly performed between the repetition ranges of 6-12, while power lifts were most commonly performed with a repetition range of less than 6. Based on the respondents, core and assistance strength and endurance exercises, along

with power lifts were performed 3-4 times per week, which is the highest among all other exercise categories. Respondents reported performing other exercise categories such as plyometric and balance and stability exercises only as often as 1-2 times per week. The only category of exercises that was reported being performed over 4 times per week was flexibility exercises. Forty-seven percent of respondents reported that.

Applications in Sport

The results show that in the study's sample certain exercise categories are more commonly used than others, and the perception of their usefulness are consistent among respondents. For place-kickers, flexibility and plyometric exercises seem to be the most beneficial for this specific type of athlete, probably due to the need for explosive strength and power, as well as improved range of motion during the kicking swing. According to the study, plyometric training was not used by 100% of the place-kickers, but it had the second highest mean respondent rating. The results support the notion that coaches should consider incorporating appropriate plyometric exercises at least 1-2 times per week in the offseason in order to maximize in-season performance. Interestingly, dynamic stretching was the most popular mode of flexibility exercises and the highest rated. Core strength, speed, and balance/stability exercises rated highly in this study and should be considered seriously in a kicker's offseason program. This study was general in nature in its examination of place-kickers' strength and conditioning practices. Future research should be done with more of a specific focus, especially to examine various flexibility and plyometric exercises that elite kickers are using today.

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