REVIEW OF SPORTS PERFORMANCE RESEARCH WITH YOUTH, COLLEGIATE, AND ELITE ATHLETES

JAMES K. LUISELLI AND KATHRYN E. WOODS

MAY INSTITUTE

AND

DEREK D. REED

UNIVERSITY OF KANSAS

This brief review summarizes translational and intervention research in the area of sports performance. We describe studies with youth, collegiate, and elite athletes; identify recent trends; and propose recommendations for future research.

Key words: applied behavior analysis, athletic skills, sports performance

Behavior analysts have studied sports performance for over three decades (Martin & Tkachuk, 2000), including applications with youth, collegiate, and elite athletes participating in baseball (Osborne, Rudrud, & Zezoney, 1990), basketball (Kladopoulos & McComas, 2001), figure skating (Ming & Martin, 1996), football (Ward & Carnes, 2002), ice hockey (Rogerson & Hrycaiko, 2002), soccer (Brobst & Ward, 2002), swimming (Hume & Crossman, 1992), and tennis (Allison & Ayllon, 1980). This research has focused primarily on interventions that were implemented directly with performers and through consultation with coaches and trainers. Interest in behavioral sport psychology has grown (Luiselli & Reed, 2011; Martin, 2011), producing refined methods and an expanded research focus. Behavior analysts continue to examine the merits of applying basic learning principles to evaluate and predict competitive sports outcomes. Our purpose in this review is to highlight (a) the types of sports performance research published in the Journal of Applied Behavior Analysis during the past 5 years, (b) the implications of these research findings for sports performance professionals, and (c) the increase in translational approaches to the athletic arena.

Recent intervention studies designed to enhance athletic performance have targeted previously researched sports (e.g., football) as well as relatively new ones such as rugby and gymnastics. In research with high school football players, Stokes, Luiselli, and Reed (2010) developed a 10-step task analysis of tackling skills based on recommendations by the American Football Coaches Association (1995). During practice sessions, coach- and teammate-delivered positive reinforcement (praise and helmet stickers) increased correct execution of tackling skills by two linebackers. Similarly, Stokes, Luiselli, Reed, and Fleming (2010) increased offensive line blocking proficiency of high school football athletes when the coach implemented descriptive feedback (praise and correction) combined with video feedback (viewing practice videotapes) and performance feedback provided by an audible stimulus (teaching with acoustical guidance [TAG]; Pryor, 1999). Both studies by Stokes and colleagues found that the skills practiced and acquired during intervention were displayed successfully in games.

Also studying football, Smith and Ward (2006) reported that three intervention procedures improved wide receiver skills (blocks,
routes, releases) of collegiate players: (a) public posting plus verbal feedback: display of a daily performance chart with praise and error correction from the coach; (b) goal setting plus verbal feedback: players set a minimum of 90% correct performance criterion before practice with praise and error correction from the coach; and (c) public posting plus verbal feedback plus goal setting: reintroduction of the daily performance chart with the two previous intervention procedures. Notably, the coaches and players rated public posting plus verbal feedback plus goal setting as the most preferred combination.

In a related example, Mellalieu, Hanton, and O’Brien (2006) found that goal setting in the form of a three-stage intervention enhanced multiple skills of college rugby players over an entire competitive season. Each player selected a performance improvement objective, scored performance according to a goal-attainment scaling formula, and reviewed performance outcomes with the researchers 48 hr before each match.

Finally, Boyer, Miltenberger, Batsche, and Fogel (2009) instructed young, competitive female gymnasts to watch video modeling of an expert gymnast perform skills, followed by their own performance of the same skills, concluding with freeze-framed and side-by-side video clips of both performers at five different points. The video modeling by experts with corresponding feedback improved skill performance more quickly than regular practice and coaching alone.

In both earlier and more recent intervention studies, coaches were integrally involved in defining target behaviors, collecting data, and implementing procedures. Specific coaching behaviors addressed proper technique to prevent potential injuries and preparing athletes for successful game play and individual competitions. Regarding social validation, coaches and athletes rated the methods employed in these studies favorably (Stokes, Luiselli, Reed, et al., 2010; Mellalieu et al., 2006). Going forward, behavior analysts who concentrate on sports performance research should continue to assess strategies for assessing and promoting generalization. For example, does intervention for some athletic skills produce similar effects on nontargeted skills? Also, it is critically important that skills acquired during practice are displayed fluently during competition (Martin, Vause, & Schwartzman, 2005). Concerning maintenance, the skills learned through intervention may diminish over time (Stokes, Luiselli, Reed, et al., 2010), indicating the need for follow-up or booster training.

In translational approaches to behavioral research, behavior analysts are interested in demonstrating the generalizability of nonhuman studies on basic behavioral processes to everyday human events (see Mace & Critchfield, 2010). This has been the case with recent sports performance research, due to the clear quantification of responses and reinforcers (e.g., two- and three-point shot attempts and points made in basketball) and the wide availability of such data on sports Web sites (see Reed, 2011). In a seminal example of the applicability of behavioral processes to sports performance, Vollmer and Bourret (2000) demonstrated that the matching law (i.e., relative rates of behavior match relative rates of reinforcement) could explain and predict college basketball players’ field goal shot selections. Subsequently, Romanowich, Bourret, and Vollmer (2007) replicated these findings in professional basketball. In a recent extension of these findings, Alferink, Critchfield, Hitt, and Higgins (2009) demonstrated that basketball players’ degree of conformance to the matching law varied as a function of skill or ability.

In a similar series of analyses, Reed, Critchfield, and Martens (2006) suggested that offensive play selection (passing and rushing) across various levels (e.g., college, professional, etc.) of American-rules football could be explained and accurately predicted via the matching law. In these analyses, Reed and colleagues found that play-calling patterns varied systematically as a
function of down (i.e., there was a relative bias for passing on third down) and turnover risk (i.e., there was a relative bias for passing as fumble risks increased). In a subsequent study, Stilling and Critchfield (2010) more thoroughly examined the role of situation-specific variables on offensive play calling in football, demonstrating that the matching law provides both an accurate and operant explanation of play-calling strategies across situation-specific variables (e.g., time left in the half, yards needed for a first down, distance from the goal line, score, and down).

Beyond the matching law, sports performance has served as a translational conduit to understanding the role of behavioral momentum in natural settings (see Roane, 2011). For example, Mace, Lalli, Shea, and Nevin (1992) and Roane, Kelley, Trosclair, and Hauer (2004) demonstrated that college basketball teams’ resistance to adversity increased as a function of relatively higher reinforcement rates. These researchers also documented that a strategic use of time-outs could disrupt opponents’ rates of reinforcement, providing an applied example of how the principles of behavioral momentum could be adapted to improve coaching success. Such translational studies of sports are important to understanding the operant relations associated with game play and performance, but also speak to the explanatory flexibility of behavioral models to describe and predict behavior–reinforcement relations in both laboratory and natural environments.

The studies we reviewed illustrate the current status of sports performance research in applied behavior analysis. As for intervention, positive reinforcement, goal setting, modeling, and graphic feedback have been effective with athletes of all ages, at different skill levels, and in many sports. Other methods, like TAG, appear to be promising but require further evaluation. The tone set by prior research in assessing the acceptability of and satisfaction with sports performance intervention objectives and procedures also should be emphasized. We suggest further that applied behavior-analytic research should compare different intervention procedures, targeting both early skill development in youth athletes and refinement of skills among proficient performers. Although the small body of translational research has concentrated primarily on quantitative analyses of collegiate and elite basketball and football players, there are certainly extensions possible to other sports, as well as further development of quantitative models derived from behavioral momentum and the matching law (Reed, 2011). On a practical level, this line of research should alert athletes and coaches to the benefits of analyzing statistics that are tied directly to performance, decision making (e.g., situational play calling), and competition strategy. Finally, following a functional analysis that manipulated coach and peer social consequences during attention and escape conditions, Stokes and Luiselli (2010) implemented a delayed, written performance feedback intervention that improved tackling skills of a high school football player. Functional analysis methodology, in fact, may be valuable in formulating athlete-specific intervention and training plans that can be adopted by coaches for a variety of individual and team sports.

REFERENCES


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