The Relationship of Skills of Elite Wheelchair Basketball Competitors to the International Functional Classification System

Frank M. Brasile and Bradley N. Hedrick

Wheelchair basketball is a fast paced exciting sport that conforms to the same standards as its stand up counterpart. Unlike most sports for persons with disabilities, wheelchair basketball is a team oriented activity that allows athletes with varying degrees and levels of disabilities to participate in an inclusive atmosphere based on a player classification system. However, over the past decade the wheelchair basketball participant has become more proficient at the skills required to participate in the activity. The purpose of this investigation was to identify the relationship between skill performance levels of elite wheelchair basketball participants and their international player classification level. Results support Vanlandewijck, Spaepen and Lysens (1995) and Brasile's (1986b, 1990) suggestions regarding the need to re-evaluate the "functional" classification system used in wheelchair basketball competitions. The study poses several implications for therapeutic recreation professionals. The most salient is that it reinforces the need for research wherein the validity of "accommodative" modifications is continually questioned and assessed relative to the purpose and goals of the endeavor.

KEY WORDS: *Wheelchair Basketball, Elite, Skills Testing, Functional Classification, Paralympics*

Wheelchair basketball is a fast paced exciting sport that conforms to the same standards as its stand up counterpart. The only noticeable difference when observing the game is that the athletes are participating in the action in wheelchairs. According to Sir Ludwig Guttmann (1976), famed neurosurgeon and founder of the Interna-

Frank M. Brasile is an Associate Professor at the University of Nebraska at Omaha and Assistant Coach of the 1996 U.S. Women's Paralympic Basketball Team. Bradley N. Hedrick is an Associate Professor at the University of Illinois and Head Coach of the 1996 U.S. Men's Paralympic Basketball Team.

tional Stoke Mandeville Games, wheelchair basketball:

> . . . is an extremely dynamic game for the paralysed, which brings into play all the adjustment forces in the neuro-muscular system and promotes a high degree of integration resulting in complete mastery of the wheelchair. Like soccer, rugby and hockey, it requires not only skill, toughness and endurance but, no less important team work and team spirit. Above all, it is a sport which demands from every player the highest degree of sensory-motor integration and self-discipline (p. 112).

Unlike most sports for persons with disabilities, wheelchair basketball is a team oriented activity that allows athletes with varying degrees and levels of disabilities to participate in an inclusive atmosphere based on a player classification system. However, over the past decade it has become apparent that the wheelchair basketball participant has become more proficient at the skills required to participate in the activity. This increase in proficiency is due to a number of factors: (a) the professionalization of wheelchair sports through the introduction of yearly instructional and training camps, (b) the development of specific texts and videos for training purposes, (c) a shift from the volunteer coach to a more professionally oriented coach, (d) rapid changes in wheelchair design, and (e) dedication of the athlete. As such, it appears to be appropriate to examine the impact of the athletes increased proficiency upon the game in general, and more specifically in relationship to the classification system that is currently being used in the sport.

The purpose of this investigation is to examine whether the current international classification system in wheelchair basketball is as valid as it is promoted to be (Strokehandl, 1986). In question is whether the current levels of classification take into consideration the capabilities of athletes to achieve and function as truly competitive team players, or, in a sense, restrict individual development because these levels may not be challenging athletes to develop to their fullest potential. Specifically, the intent of this study is to review skill levels of elite male wheelchair basketball participants from the U.S. in comparison to their functional classification levels as designated by the International Wheelchair Basketball Federation (IWBF) classification system. The study uses data acquired from a skills test that was given to participants in the initial tryout camp for the 1994 U.S. Gold Cup Team. The team eventually went on to capture the 6th Gold Cup title in Edmonton, Alberta, Canada.

Literature Review

To assist in understanding the complexity of this issue, the focus of the following section will be on classification and wheelchair basketball, and its relationship to performance or functional ability.

Classification and Wheelchair Basketball

In a publication related to classification and sport for disabled athletes who participate in international competitions produced by the Barcelona '92 Olympic Organizing Committee (COOB), classification of disabled athletes was described as follows:

> In all competitions specifically for disabled athletes, medical classifications constitute a leveling factor between physical capacity and competitivity. Years of hard work have gone into the development of classification systems which ensure that disabled athletes of the same class compete as far as possible in conditions of equality, and this has caused a diminishment in that other important aspect of sports for the disabled, competitivity (COOB, 1992, p. 3).

Guttmann (1976) described the aim of classification in wheelchair sports to "ensure fair play and to eliminate as far as possible injustices between participants in the same class and to give priority to the more severely disabled" (p. 35). Strohkendl (1986) described the purpose of classification of athletes with disabilities as a mean of equalizing competition among individuals with varying degrees of disabilities.

> An efficient and effective classification system is a prerequisite to the establishment of fair and equitable competition within the International Stoke Mandeville Games Federation (ISMGF). The classification system must give each physically disabled individual an equal opportunity to compete on a national and international level. No reasonable argument exists to exclude any individual from competition because of the nature, cause, or severity of the disability (Strohkendl, 1986, p. 101).

Of most importance in an effective functional classification system is the level of trunk function. Strohkendl elaborated further on this aspect of the classification system:

> If we observe premier players with different functional limitations, then we readily recognize that the level of trunk function directly affects performance capability in regard to the different skills involved. Therefore, the level of sitting balance and trunk movement of the athletes become the fundamental elements used in the definition of classes and in the development of a testing procedure fair to all (Strohkendl, 1986, p. 102).

In wheelchair basketball there are two specific classification systems: one for competition in the U.S. and one for international competition. In the U.S., the classification system is predicated upon a medically oriented model or injury level of involvement. A Class I athlete is the more severely disabled participant (T-7 or above), the Class II athlete moderately disabled (T-7 through L-2), and the Class III participant the least disabled (L-2 or below). For competitions, each athlete is given a point value equal to his or her classification level (i.e., Class I = 1 point, Class II = 2, Class III = 3). In competition in the U.S., a team is allowed to have players participating with a total of value points no greater than 12, nor more than three Class III players playing together at the same time.

Internationally, wheelchair basketball participants are placed into one of eight classification levels for participation. The IWBF uses a point system that is similar to the old medical system used in the U.S. Additionally, the IWBF has introduced half point values "to make the new system more flexible, especially with regard to borderline cases" (COOB, 1992). Each classification is also given a numerical value. Similar to that of the U.S. system, functional potential is represented by paraplegics with complete lesions originating at the levels listed next to the class. Class I equals 1 and 1.5 points (T-7 and above), Class II equals 2 and 2.5 points (T-8 to L-1), Class III equals 3 and 3.5 points (L-2 to L-4), Class IV equals 4 and 4.5 points (L-5). In international competition, no more than fourteen points may be represented on the court at one time.

The reported intent of the half point system is for it to be used for only dubious borderline cases where no objective criteria can be found to identify a player's class and thus help to reduce the danger of inflation. According to the IWBF, the introduction of the half point value has two main purposes: (a) the application of the new system is easier and more flexible, and (b) the players feel better psychologically. Questions remain, however, about whether this classification system is too cumbersome, especially at the elite level. Does the system take into consid-

eration the capabilities of athletes to achieve and function as truly competitive team players and develop individual skills according to their abilities?

Weiss and Curtis (1986) were succinct when they described the reason for classification in wheelchair sports: "The idea is to allow athletic prowess, rather than sheer physical advantage, to determine the victory" (p. 94). Does the functional system used by the IWBF consider athletic prowess of the participant, or does it place more of an emphasis on the medical model and act as a disability specific, rather than functional, system? Weiss and Curtis (1986) go on to state:

> Whether any of the classification systems have achieved this goal (to allow the disabled to compete fairly based on athletic ability) is controversial. Despite changes, both past and impending, little systematic study that evaluates the efficacy of medical classification has been completed (p. 100).

One method that has been used to evaluate the efficacy of the medical classification system for wheelchair basketball has been the use of skills tests.

Skills Development and Skills Testing

Learning, developing, and retaining specific skills comprise the essence and foundation of physical education and sport. Accordingly, skill acquisition and development in specific sports constitutes a major emphasis for all programs. The development of individual skills does and should play an important role in the performance of a wheelchair basketball player. Brad Hedrick (1994), coach of the 1994 Men's Gold Cup Wheelchair Basketball Championship team states, "The perfection of fundamental individual and team skills is perhaps the most significant contributor to success in basketball, wheelchair or otherwise" (p. 11). Skill acquisition must not be overlooked in a training regimen, and skill acquisition can assist any athlete in performing better at the activity and thus give him or her the competitive edge over his or her competitive counterpart. In this case the emphasis on disability in wheelchair sports is diminished. Skills testing can be valuable for purposes of grouping and training for athletes in all sports. Skills tests, in effect, reflect ability of individuals to participate in specific sport activities. The primary purpose of skill tests is to measure progress or level of achievement.

Most skills tests claim to have face validity. According to Collins and Hodges (1978), an example of this kind of validity is when a test component is the same as a particular skill required within a certain sport. Evaluating individual achievement in skills tests is usually accomplished through matching an individual's score with established norms.

According to Thiboutot (1986), the analysis of skills of wheelchair basketball players could be beneficial in the classification process.

> Players and coaches, as well as many medical examiners, have come to recognize that an analysis of wheelchair basketball skills—namely pushing the wheelchair, shooting and dribbling, throwing and catching a pass—is a more accurate determinant of class than the examiner's pin pricking or muscle probing (p. 43).

Since the summer of 1989, wheelchair basketball participants who have attended the National Wheelchair Basketball Association (NWBA)/Paralyzed Veterans of America (PVA) summer basketball camps have been introduced to an opening day skills test upon arrival. Scores acquired from these tests have been used to place participants in groups for instructional and participatory purposes while at camp. This particular skills test was developed as a result of previous research

related to wheelchair basketball skills testing (Brasile, 1984).

The initial version of the wheelchair basketball skills test consisted of the following seven items: 20 meter sprint, obstacle dribble, speed pass, pass for accuracy, baskets per minute, rebounding, and free throws (Brasile, 1984). Also included were directions for administration and *T* score scale information for coaches who could then administer this test and also judge the levels at which their athletes were participating. The following year this wheelchair basketball skills test was modified and used to obtain information from the 1986 U.S. Men's Gold Cup Team. This test introduced the concept of acquiring information regarding the athlete's ability to use dominant and non-dominant hands in participation (Brasile, 1986a). This skills test will hence be refered to as the NWBA/PVA Skills Test.

Skill Performance in Relation to Disability Related Classification

Brasile (1986b, 1990) used skills tests results in an attempt to understand better the relationship between disability levels, as specified by NWBA classification levels, and participant skill levels. Both of these investigations indicated that Class II and Class III athletes appeared to be close in skill level; Class I participants appeared to have lower skill level than their counterparts. In 1987, Vanlerberghe and Slock developed a wheelchair basketball skills test to study relationships among wheelchair basketball skills and disability levels and perceived skill levels. The authors reported significant variance in skill levels based upon disability classification levels, and strong correlations between coaches' evaluations of athletes and athlete skill levels. The authors noted that a *T* scale should be developed to demonstrate individual skill levels; lack of a significant number of participants prevented them from completing this task. Kabele (1989) used the test described in Brasile (1986a) in an attempt to study the level of skill of Czechoslovak national team members compared to skill levels of U.S. team participants. This study revealed lower levels of skill among the Czechoslovak players in all areas.

In 1990, Brasile reported results acquired from the NWBA/PVA Skills Test. This study indicated there may be factors other than disability level that influence performance. These factors included hours of practice per week, previous experience in wheelchair basketball, previous experience in basketball prior to injury, and age affected skill levels. In 1993, Brasile evaluated the skill levels of the 1992 U.S. Women's Paralympic Silver Medal Team with those of the 1986 U.S. Men's Gold Cup Champions. Results indicated that women in the U.S. have developed to a level equal to their elite male counterparts in relationship to overall skills needed to participate in the sport. Women seemed better in the skill areas that require agility and fine motor discipline, and men appeared to do better in the areas that require strength.

Strohkendl (1986) believes that disability and skill acquisition are two separate issues.

> The skills, talents, and level of training of a player should not affect his or her sport classification. The classification system should be based instead on the functional limitations caused by the physical disability. The disability understandably affects the player's capability for performing the different skills of wheelchair basketball such as pushing (wheeling) the chair, catching and throwing the ball, shooting, and dribbling (p. 102).

As such, the aforementioned research is only valid at judging skills and talent and not "functional limitations." Strohkendl would assert that there are other dynamics of the sport that need to be taken into consideration when placing wheelchair basketball participants in their classification categories.

To date, one study has examined the via-

bility of the functional classification system used in wheelchair basketball at the international level, and its relationship to the functional classification system. Vanlandewijck, Spaepen and Lysens (1995) reported that based upon the observed field and fitness performance of 52 elite wheelchair basketball players, no clear distinction could be shown among international Classes II, III, and IV players, and that significant differences for the Class I wheelchair basketball participant may be reflected in the inability of Class I participants to develop active stability and rotation of the trunk. Most studies which have focused on the relationship of athletic prowess and classification levels have been based upon results from skills testing. In referencing two of these skills test results, Vanlandewijck, Spaepen and Lysens (1995) go on to state, "The present results on field performance and the evaluation of aerobic power and force application on the handrims support the suggestion of Brasile (1986b, 1990) to reduce the number of classes to two, amalgamating the upper classes to one" (p. 149).

Accordingly, it is apparent that a strategy to judge the functional levels of wheelchair basketball players in relationship to their functional classification levels would be to use an instrument that combines analysis of wheelchair basketball skills and trunk function and balance. This instrument should be used to assess the influence that level of disability plays in the athletic performance of the individual. It should be able to determine, to a certain extent, how the individual performs as a team player on a comparable level with all other participants. Results should help determine if the current classification system used in international competitions is appropriate for use at the elite level in this sport.

Research Objectives

This investigation has been guided by the following research objectives and hypothesis:

Research Objective 1. To identify the relationship between skill performance levels of elite wheelchair basketball participants and their international player classification level.

Hypothesis 1. There will be no relationship between level of performance as a result of skills test data and the international wheelchair basketball classification level of the participant.

Research Objective 2. To identify underlying patterns for consideration for future classification of wheelchair basketball participants.

Method

Subjects

The sample was comprised of 31 male wheelchair basketball participants who were invited to try out for the U.S. Men's Gold Cup Team. Tryouts were held at the United States Olympic Training Center during August 1993. The participants in this study were all selected to try out for this team by the coaches of the U.S. men's program and were considered to be the best in the sport in relation to their specific IWBF classification levels. The coaches paid special attention to assure that they would have enough players from each of the classification categories to assist them in fielding as competitive a team as possible. In regard to IWBF classification levels, eight individuals were Class I participants, nine were Class II participants, six were Class III participants, and eight were Class IV participants. Additionally, within each category certain athletes were classified at the half point (.5) level.

Instrumentation

The skills test used was a combination of previous test items used by Brasile (1986a, 1990) and new items developed by the researchers and U.S. national team coaching staff to assist in getting a better overall picture of the skills used in the game and needed to compete at the international level. In total, there were 10 items included in the skills

test. Specific test items from Brasile (1990) were the 20 Meter Sprint, the Pass for Accuracy (left and right hands 25 feet from the target), and the Spot Shot. The additional items used included the 3 Point Shot (players shot four shots from behind the 3 point arc on the left and right and at the top of the key for a maximum score of 12), Full Speed Lay Up (left and right hand), Free Throws (10 attempts from each side), and the Line Drill (left and right hand).

The new shooting tests (Free Throws and 3 Point Shot) were used to acquire information needed by the coaches for game related situations. The Full Speed Lay Up Drill from the left and right side, and the Line Drill (left and right hand) were used to emphasize acceleration, quick change in drill, ball management, and directionality and agility from both sides of the body. It was also the intent to use these new tests to place more of an emphasis on trunk instability and balance which have been used continually as a defining variable for classification by "functional" classifiers.

In the Full Speed Lay Up drill, the players began at half court on the signal from the coach. The athletes were required to accelerate to full speed to take a pass from the test administrator while in motion at about the free throw line, and then proceed at full speed to make the lay-up. This was done similarly on both sides. One point was given for each basket made.

The Line Drill test required the athlete to begin dribbling from behind the baseline under the basket and then to proceed to the first free throw line dribbling at full speed while pushing the chair. Then the athlete was required to turn and proceed back to the starting point while continuing the dribble with the same hand. When the athlete reached the starting line, he turned and proceeded to the half court line while dribbling. When he reached that spot (half court line) he was to once again turn and proceed back to the first free throw line. Upon passing the first free throw line, he was then required to once again turn and proceed past the half court line up to the second free throw line (on the opposite side of the court), once again turn, and return to the half court line. When he reached the half court line, he was then required to turn and proceed past the second free throw line to the baseline on that side of the court. Once he passed that baseline, he was required to continue the dribble, turn and proceed back to the second free throw line, turn, and proceed to the second baseline. Upon passing that second baseline for the second time, the drill was over and the time was recorded.

Some of the tests were more sport specific (e.g., 3 Point Shot, Free Throws, 20 Meter Sprint, Spot Shot, 25 foot Pass for Accuracy) while others were wheelchair basketball specific for the purposes of testing balance, as well as hand and arm function, on a bi-directional basis (e.g., Full Speed Lay Up, Line Drill). The primary reason for including these last two tests in the battery was to create an assessment tool to judge the functional ability of the athlete in actions thought to be critical for functional classification by the international functional classifier.

Procedure

The skills test instrument was administered to the subjects on the first day of the tryout camp. The head coach and his assistants were in charge of testing and data collection. The athletes were informed that their results would assist in the team selection process.

Analysis and Results

The first step in the analysis was to transform all skills test scores into standard scores (z scores). This was done so that the data could be observed on a scale with an equal mean and equal standard deviation. The z scores for each skills test by classification level are shown in Table 1. Next, a multivariate analysis of variance (MANOVA), with the eight classes as the independent variables

Table 1.

z Score Results by International Class on Specific Skills Tests

Class	SPRINT	LDL	LDR	3 PT	PASSL	PASSR	SPOT	FSLUL	FSLUR	FREETHR
I	**−1.18**	**−0.91**	**−1.26**	**−0.93**	**−1.08**	**−0.72**	−0.33	**−0.85**	**−0.74**	−0.28
I.5	−0.35	−0.74	−0.54	−0.63	0.16	−0.34	0.14	−0.29	−0.60	−0.47
II	0.35	−0.18	0.23	−0.22	−0.44	0.26	−0.21	0.10	−0.51	−0.08
II.5	0.12	0.73	0.53	1.14	1.14	−0.10	−0.28	0.50	0.52	**−0.79**
III	−0.02	0.23	0.20	0.05	0.36	0.26	0.62	0.07	0.42	0.95
III.5	0.35	0.22	0.73	0.26	0.24	0.17	0.00	0.18	0.42	0.24
IV	0.72	−0.10	0.42	−0.08	0.37	0.20	**−0.41**	0.03	0.88	0.00
IV.5	0.25	0.93	0.28	0.79	0.22	0.23	0.41	0.47	0.37	0.28

Note. Score in **bold** indicates lowest mean score for the specific skills test; Score underlined indicates highest score for the specific skills test; The following is an explanation of the abbreviations used in the table: SPRINT = 20 Meter Sprint; LDR = Line Drill Right Hand; LDL = Line Drill Left Hand; 3 PT = Three Point Shot; PASSL = Pass For Accuracy Left Hand; PASSR = Pass For Accuracy Right Hand; SPOT = Spotshot; FSLUL = Full Speed Layup Left Side; FSLUR = Full Speed Layup Right Side; FREETHR = Freethrows.

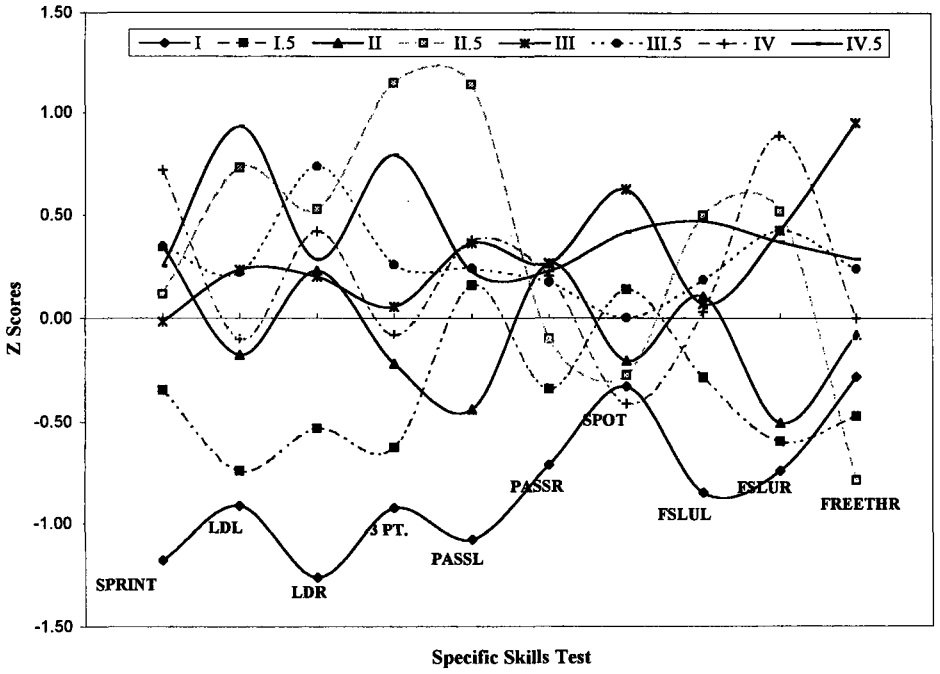

FIGURE 1. U.S. GOLD CUP TEAM SKILLS TEST Z SCORES BY SPECIFIC TEST ITEM USING THE CURRENT INTERNATIONAL EIGHT CLASS SYSTEM.

and the ten skills test items as the dependent variables, was performed to ascertain whether classification level had any association with skill level. No significant results were found ($F = 0.973, p = 0.543$). For ease of interpretation, graphical representation of the MANOVA results is presented in Figure 1. There is only one obvious trend in the data depicted in Figure 1 and that is that those athletes who were in the Class I category appeared to score lowest on eight of the ten skills test items. When viewing the other classes and their mean scores, no discernible trend can be observed. This lack of significant results led to the next step in the investigation as outlined in Research Objective 2, to identify underlying patterns for consideration for future classification of wheelchair basketball participants.

To achieve this objective, the next step was to consider compressing the classification groups from eight to four. To do so, a series of t-tests were performed on each categorical level (i.e., Class I and I.5, Class II and II.5, Class III and III.5 and Class IV & IV.5). This statistical procedure resulted in no significant differences at each level. For the purposes of this investigation then, the compression of these eight classes into four classes was deemed appropriate. Standardized mean scores for each test were once again calculated for representation and the results of this compression can be observed in Figure 2.

Figure 2 suggests that Class I level participants appear to be weaker in all skill areas than the other participants; Class II, III, and IV participants appear to be more equal in the skill levels than not. Thus, a four level classification system would not result in much improvement over the eight level classification system currently being used.

A closer examination of Table 1 sug-

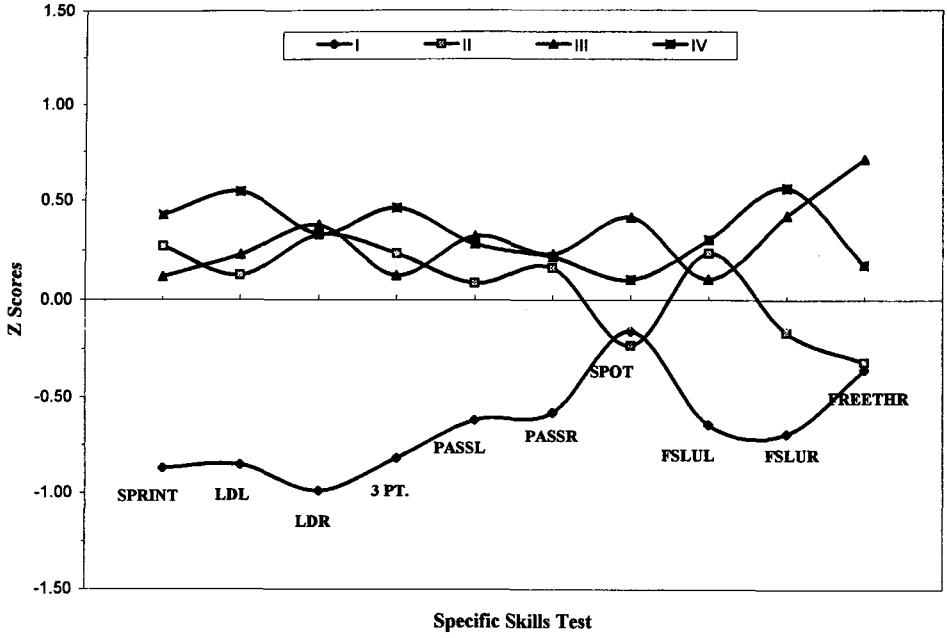

FIGURE 2. U.S. GOLD CUP TEAM SKILLS TEST Z SCORES BY SPECIFIC TEST ITEM USING A FOUR CLASS SYSTEM (1 AND 1.5 = I; 2 AND 2.5 = II; 3 AND 3.5 = III; 4 AND 4.5 = IV).

gested still another solution. It can be observed in Table 1 that the Class I athletes scored lowest in eight of the skills test items, and Class II.5 and III participants scored highest in seven of the test items. This led to the conclusion that these results should now be analyzed with a three level classification system: a) Class I (all Class I participants), b) Class II (all Class I.5 and Class II participants), and c) Class III (all Class II.5, III, III.5, IV, and IV.5 participants).

A multivariate analysis of variance (MANOVA) using these classes was performed to ascertain whether the three classification groups performed at equal proficiency levels across all test items. The analysis indicated significant differences in scores across class levels (Wilks' lambda, $F = 2.03, p < 0.01$). Univariate analyses were employed as a means of determining specific significant differences. Results, presented in Table 2, indicate significant univariate differences for six of the ten tests.

According to the guidelines for post hoc comparisons discussed in Keppel and Zedeck (1989), additional investigation was conducted into the group differences (Tukey's studentized range, HSD). The results indicate the scores for Class I participants were significantly lower than those for both the new Class II and III participants in the 20 Meter Sprint and the Line Drill (right), Additionally, the new Class I and Class III participants demonstrated a significant difference in their scores in the following test items: Line Drill Left, Pass For Accuracy Left, Three Point Shot, and Full Speed Lay-up (right).

Once again for ease of interpretation, the scores for these three new classes are graphically presented in Figure 3. It can be observed that there now appears to be a dis-

Table 2.

Analysis of Variance of Skills Test Item Scores by Three Class Levels (df = 2,28)

Test Item	Overall Test (N = 31) M	Overall Test SD	Class I[a] (n = 5) M	Class II[b] (n = 9) M	Class III[c] (n = 17) M	Univariate F-Ratio
SPRINT	5.82	0.52	6.43	5.76	5.69	5.24*
LDR	56.94	5.36	63.7	57.08	54.89	6.05**
LDL	58.94	5.62	63.59	60.51	55.84	6.79**
3 PT	3.87	2.45	1.6	3.0	5.0	6.07**
PASSL	14.03	6.14	7.4	12.55	16.76	6.71**
PASSR	20.55	5.52	16.6	20.89	21.53	1.63
SPOT	8.0	2.42	7.2	7.78	8.35	0.47
FSLUL	5.61	2.12	3.8	5.55	6.17	2.70
FSLUR	7.74	1.8	6.4	6.77	5.61	6.58**
FREETHR	6.0	2.11	5.4	5.55	6.41	0.71

Note. Multivariate F = 2.03.** [a]Class I includes subjects who were classified as International Wheelchair Basketball Federation (IWBF) Class I participants.
[b] Class II includes subjects who were classified as IWBF Class I.5 and II participants.
[c] Class III includes those subjects who were classified as IWBF Class II.5, III, III.5, IV, and IV.5 participants.
* $p < 0.05$. ** $p < 0.01$.

cernible trend in relation to skill levels, and the new categorization of the athletes has had the effect of differentiating them more clearly and appropriately.

Discussion

Since wheelchair basketball's inception in the late 1940's, the rules governing play in this sport have been parsimoniously designed such that modifications to the rules of its analog version have only been introduced when necessary to accommodate play in a wheelchair. This approach is consistent with the widely held tenet that persons with disabilities should be afforded programmatic access in the most integrated or "least restrictive" context. Although wheelchair basketball is a totally segregated sport context, the sport's competition rules have been developed so as to retain as much of the essence of the sport's analog as possible. In keeping with the aforementioned principle, the physical classification system used to promote competitive equity among wheelchair basketball participants with varying levels of disability-related motor function should also reflect this parsimonious philosophy of adaptation. To fulfill the criterion of affording a "least restrictive" context, the physical classification system should not unnecessarily segregate or label the athletes who participate.

"Sport performance" is a primary concern for all athletes, and the central concern for those participating in international competition. Therefore, the most appropriate criterion against which to assess the validity of a wheelchair basketball physical classification system is performance. Proponents of the current IWBF classification system note that it was designed to discriminate among athletes on the basis of variation in trunk stability and balance. However, for the categories to be "least restrictive" in nature,

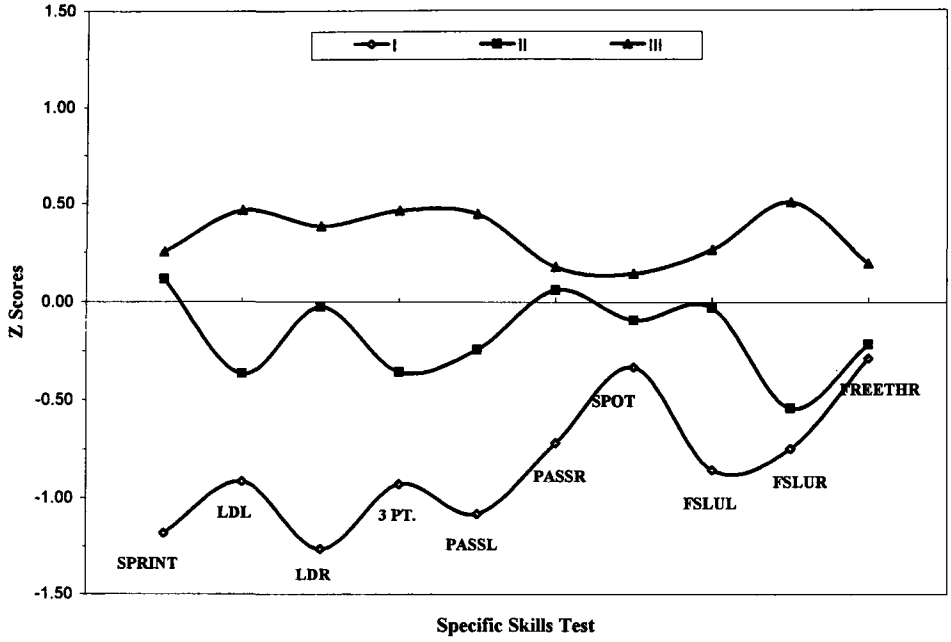

FIGURE 3. U.S. GOLD CUP TEAM SKILLS TEST Z-SCORES BY SPECIFIC TEST ITEM USING A THREE CLASS SYSTEM (1 = I; 1.5 AND 2 = II; 2.5, 3, 3.5, 4, AND 4.5 = III).

variation in trunk stability and balance should correspond directly to variation in sport performance.

To address this concern, 6 of the 10 skill tests used in this investigation with 31 U.S. Paralympic Trial participants were designed to be dependent upon speed, reactive movements at full speed, and/or rapid change of direction. Three of the four remaining skill tests were designed to assess sport-specific skills which required substantial upper body power (i.e., a 25 foot pass for accuracy with the left and right arms, and a three point shooting drill). Free throw shooting constituted the sole remaining subtest. If variation in trunk stability and balance, as reflected in the athletes' IWBF classification levels, does inhibit sport performance potential, the performance of skill tests emphasizing speed, change of direction, reactive movement, and power should identify these differentials. If not, the question must be asked, "Why are athletes with comparable sport performance capabilities being artificially segregated from one another within the classification system?"

The results of the current investigation indicated that the athletes' IWBF classification level, as a measure of trunk stability and balance, did not discriminate among the athletes' tested with regard to their wheelchair basketball specific skills. Indeed, results revealed that the lower classes (involving individuals with more severe disabilities) often averaged higher scores on these tests than their lesser disabled counterparts. Thus, the results of the present investigation support the suggestions of Vanlandewijck, et al. (1995) and Brasile (1986b, 1990) that the "functional" classification system used in wheelchair basketball be re-evaluated.

The results of the present study indicate

that a three tiered classification system would optimally discriminate among the athletes. Data suggest that the current international class 1.0 participants should remain a class unto themselves. The current international class 1.5 and 2.0 participants would be combined to create another class. Finally, classes 2.5 through 4.5 would be collapsed together to form a third category. This three class system, in combination with a restriction prohibiting more than 12 points on the floor at one time, may be the most parsimonious classification model based upon skill test performance criteria.

The present study poses several implications for therapeutic recreation professionals. The most salient is that it reinforces the need for recreation research in adapted sports and recreation wherein the validity of "accommodative" modifications is continually questioned and assessed relative to the purpose and goals of the endeavor. Concurrently, therapeutic recreation professionals must remain ever vigilant advocates for the introduction of the least restrictive and/or least obtrusive modifications necessary to accommodate leisure participation, as elite or recreational sport participants. Just as persons with disabilities must not be unnecessarily segregated from their nondisabled peers when integrated participation in leisure activities is possible, they should not be unnecessarily separated from themselves, or labeled within segregated programs such as wheelchair basketball. Unwarranted segregation inherently reflects the devaluation of individual abilities, and that is a message that therapeutic recreation professionals must not promote.

As for future research, it is clear that this study must be replicated with recreational participants, since substantially different results might well be derived with a recreational sample rather than an elite one. By definition, elite athletes are more homogenous in skill. Thus, the eight class system currently in use may be validated on the basis of skills test performance with recreational participants. However, a three class system may suffice for elite performers. Secondly, this study must be repeated with a broader range of international elite athletes to assess the generalizability of the findings beyond elite U.S. athletes. The validity of the subtests as sport skill measures may be adversely affected by variation within the international community with regard to the training and techniques taught by the respective international coaches.

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