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CURRENT STATUS AND ASSESSMENT OF QUANTITATIVE AND QUALITATIVE ONE LEG BALANCING ABILITY IN 3-6 YEAR OLD CHILDREN

Doritea DU TOIT & Anita E. PIENAAR
Skool vir Biokinetika, Rekreasie en Sport Wetenskap, Potchefstroomse Universiteit vir Christelike Hoër Onderwys, Potchefstroom, Republiek van Suid-Afrika

ABSTRACT

Qualitative assessment (the developmental quality of the movement), of the one leg balance is not as commonly used as quantitative assessment (the measurable time in seconds), possibly prohibiting the accurate identifying of balance problems. The purpose of this study was to determine the current status of the quantitative and qualitative balancing ability in a selected group of South African children, and to examine the interrelationships between the quantitative and qualitative results of 3-6 year old children as to propose a more accurate assessment of the one leg balance. The subjects (N=514), aged 3-6 years, were quantitatively and qualitatively assessed using valid norms and criteria found in the literature. The effect sizes measuring the relationship between the quantitative and qualitative assessments as determined by the Phi-score, showed a large effect for the 4 year olds (ES>0.8), and small effects for the 5 and 6 year olds (ES>0.2). A relatively large percentage (44.10%) of 3 year olds scored well above the average level for their age in both the quantitative and qualitative assessment, indicating that the norms and criteria used might not be appropriate for 3 year olds. Relatively large percentages (25.27%-27.47%) of the 6 year olds scored below the average level for 5 year olds in the qualitative assessment, suggesting developmental balance delays or disorders that might not have been identified by means of only a quantitative assessment. These findings indicate that, when evaluating the one leg balance in children aged 3-6 years, a quantitative and qualitative assessment should be used in combination together to assure a more accurate assessment.

Key words: Qualitative assessment; Quantitative assessment; One leg balance; Preschool; Gross motor development.

INTRODUCTION

Balance is considered to be fundamental to gross motor development (Butterfield & Loovis, 1994: 692; Auxter *et al.*, 1997: 190), as all gross motor skills require some element of balance (Clark & Watkins, 1984: 854; Gabbard, 1992: 27). Proper development of static and dynamic balance skills is therefore considered to be essential in the development of gross motor skills in children. In this regard, Ulrich and Ulrich (1985) observed that balance is most effective as a predictor of motor skill development among very young children (ages 3–5). According to Williams *et al.* (1983), lack of balance control is a characteristic common to developmentally delayed and motorically awkward children. Balance problems are therefore of concern to professionals working with the motor development of children in South Africa, as the

prevalence of developmental delays and motorical awkwardness among children in South Africa is estimated to be between 5% and 15% (Pienaar, 1994: 125).
It is therefore not surprising that balance assessment items form part of established motor or movement skill assessment batteries (Bruininks, 1978; Ulrich, 1985; Henderson & Sugden, 1992), as well as batteries developed for neurological screening purposes (Mutti *et al*., 1998). Static balance is commonly assessed in these test batteries by recording the time in seconds that the child is able to balance on one leg. This test, however, measures only the quantitative execution (the measurable time in seconds) of the specific skill. Quantitative norms for this skill in every age group from 3-6 years have been studied and defined in several studies (Arnheim & Sinclair, 1979: 136; Cratty, 1979: 50; Sugden & Henderson, 1992: 52; Reeves, 1997: 340; Goshi *et al*., 1999: 172).

The qualitative execution and development of a motor skill is also considered of great importance (Mutti *et al.*, 1998: 11; Goshi *et al*., 1999: 170; Knudson, 2000: 19) as the learning of incorrect methods and techniques in the execution of a motor skill can be detrimental to further development and refining into related or more advanced skills (e.g. balancing on one leg being refined into the hopping skill and later the skipping skill). The qualitative assessment of the proper mechanics, or the process of movement, is especially relevant at the ages of 3-6, as children are learning and developing new motor skills (Gallahue, 1996), and it serves as a guideline for the design of movement development programs for children of these ages.

Qualitative assessment, however, is less commonly used when evaluating the one leg balance in 3–6 year old children. The reasons for this could be a lack of knowledge and time to do this type of evaluation, as it requires a knowledgeable person and more time than needed for a quantitative evaluation (Gallahue, 1996). The fact that qualitative assessment is usually subjective can also contribute to it being used less often. However, according to Gallahue (1996), both the (objective) quantitative assessment and the (subjective) qualitative assessment have an important place in the developmental curriculum as the use of both makes the assessment process more accurate. The stage concept of motor development during early childhood (2-7 years) involves qualitatively classifying individuals at different stages of development of a fundamental movement skill (Gallahue & Ozmun, 1995: 226). The three popular methods of charting the stage classification of children are the segmental analysis approach, where the separate components of movement within a given pattern are analyzed (Roberton, 1982: 294); the total body configuration approach, where an overall stage classification score is assigned (Seefeldt & Haubenstricker, 1982: 309); and a combination of the above two methods to qualitatively classify an individual at a developmental stage (Gallahue & Ozmun, 1995: 226). According to Gallahue & Ozmun (1995), the latter system offers a practical and reliable system for classifying individuals at the initial, elementary and mature stage in a given fundamental movement skill. If this qualitative classifying system of developmental stages could be used as a means of evaluating the one leg balance qualitatively together with the results of the quantitative assessment, this might contribute to a more accurate assessment process.

Therefore, it is hypothesized that by using both a quantitative assessment and a qualitative stages evaluation when assessing balance, problems in this area can be identified and development evaluated with more clarity. If a child can score well in a quantitative assessment, but poorly in the qualitative assessment of the same skill (e.g. balancing on one

leg for the required time but showing extensive arm movements), this could indicate an existing balance problem which would otherwise not have been recognised through a quantitative assessment alone. According to Haywood (1986) it is also possible that at certain ages and on certain tasks, especially balance tasks, children attempt a more mature qualitative performance pattern with a resulting, presumably temporary, decline in quantitative score. The identification of any problems in balance is extremely important in the 3-6 year age period, as this is the primary developmental period for balance and related gross motor skills (Gallahue & Ozmun, 1995: 86). Intervention of such problems is imperative in these early years in order to prohibit further gross motor development delays. If the developmental stages of the one leg balance in 3-6 year old children according to the classification system of Gallahue and Ozmun (1995) correlates with the quantitative norms for this skill as found in the literature (Bruininks, 1978: 53; Gustafson-Munro, 1985: 15; Henderson & Sugden, 1992: 52) it would be an indication that these qualitative developmental criteria could be used as a useful qualitative evaluation for static balance at these ages. The primary purpose of this study is therefore to determine if the use of both the quantitative and qualitative assessment is a more comprehensive way of assessing static balance in children of these ages. To determine this, the following questions have to be answered: Firstly, what is the current status of quantitative and qualitative one leg balancing ability in a selected group of 3-6 year old children in South Africa, and secondly, what is the relationship between quantitative norms and qualitative developmental criteria for the one leg balance test in these 3-6 year old children?

PROCEDURES

Subjects

The number of subjects included in this study were 514 children (254 male and 260 female), of the ages 3 (n=161, 81 male and 80 female); 4 (n=146, 70 male and 74 female); 5 (n=116, 51 male and 65 female) and 6 (n=91, 52 male and 39 female) years respectively. Age was defined by the subject's last birthday. The mean age in months for the 3, 4, 5 and 6 year olds was (year.month) 3.06 $\pm$ 0.03; 4.05 $\pm$ 0.03; 5.06 $\pm$ 0.03 and 6.04 $\pm$ 0.03 respectively. All subjects had been enrolled in the movement development program (which is an optional program) presented by movement developmentalists of the Potchefstroom University for Christian Higher Education (P.U. for C.H.E.). This program is being presented on the premises of 10 preprimary schools in Potchefstroom, as well as at the movement development research center of the university.

Assessment procedures

All the subjects were evaluated before the implementation of the program. The movement development program would be presented in weekly classes, consisting of a variety of movement activities designed to stimulate and develop gross motor development. Informed consent was obtained from the parents for each subject to participate in the research. The evaluations were conducted on the premises of the schools and at the movement development research center at the university. Each child was videotaped from the side by a trained assistant and analyzed afterwards by the researcher.

Quantitative assessment

The test entailed two trials of balancing on each leg with open eyes for as long as possible to a ceiling time of 12 seconds. The free leg had to be bent and the foot held behind the supporting

leg and the hands placed on the hips (Henderson & Sugden, 1992: 52; Mutti *et al*., 1998: 30). A trial was ended if the subject's support foot moved before the duration of 12 seconds. The higher score in each test was recorded in seconds, using a stopwatch. The preferred leg was tested first. In the 4, 5 and 6 year olds, the test was also conducted with closed eyes, as the qualitative criteria included the ability to balance with closed eyes, although these results were not interpreted for the purpose of this study.

Qualitative assessment

To obtain a qualitative score, the developmental characteristics of the performed skill was analyzed and compared to the developmental stage criteria of the expanded version of the Fundamental Movement Pattern Assessment Instrument (FMPAI) (Gallahue, 1996) for the one leg balance in children of the ages 2-7 years (Table 1). According to Gallahue (1996), the FMPAI has proven to be highly reliable among trained observers and content validity has been established for the fundamental movements. According to this system, the performed skill can qualitatively be classified into one of the three stages of fundamental motor development, namely the initial stage, the elementary stage and the mature stage. A score of (*1*) was awarded if the skill was classified as being in the initial stage of development, (*2*) if it was in the elementary stage, and (*3*) if it was classified as being in the mature stage. If the subject showed developmental characteristics of more than one stage, the skill was classified according to the stage of which the highest number of characteristics were present.

TABLE 1. **DEVELOPMENTAL STAGES OF THE ONE LEG BALANCE (ADAPTED FROM GALLAHUE & OZMUN, 1995) USED AS QUALITATIVE CRITERIA**

INITIAL STAGE	ELEMENTARY STAGE	MATURE STAGE
1. Raises nonsupporting leg several inches so that thigh is nearly parallel with contact surface 2. Either in or out of balance (no in-between) 3. Overcompensates ("windmill arms") 4. Inconsistent leg preference 5. Only momentarily balance without support 6. Eyes directed at feet	1. May lift non-supporting leg to a tied-in position on support leg 2. Cannot balance with closed eyes 3. Uses arms for balance but may tie one arm to side of body 4. Performs better on dominant leg 5. Can go into controlled balance, although not held for long	1. Can balance with closed eyes 2. Uses arms and trunk as needed to maintain balance 3. Lifts nonsupporting leg 4. Focuses on external object while balancing 5. Changes to nondominant leg without loss of balance

To compare the quantitative and qualitative scores, cut-off points for the quantitative and qualitative scores had to be established in order to give a *below average* or an *average or above average* rating to the execution of the skill by the subjects in every age group. As cut-off points in the quantitative assessment, the minimum scores reported in the literature

(Gustafson-Munro, 1985: 15; Johnston *et al*., 1987: 159; Olie, 1990: 13; Henderson & Sugden, 1992: 52; Meaney, 1993: 21).Auxter *et al.*, 1997: 256; Mutti *et al.*,1998: 68; Goshi *et al*., 1999: 172) as average values for each age group, were used (Table 2). Thus, if a subject scored lower than the cut-off point in the quantitative assessment, his / her quantitative score would be considered *below average* and would be recorded as such. If a subject had the same score or higher than the cut-off point, his / her score would be considered *average or above average* and would be recorded as such.

TABLE 2. **QUANTITATIVE NORMS FOR THE ONE LEG BALANCE**

3 years	4 years	5 years	6 years
1-3 seconds (Olie, 1990; Meany, 1993; Gallahue & Ozmun, 1995)	**2-7 seconds** (Gustafson-Munro, 1985; Auxter *et al.*, 1997; Goshi, 1999)	**8-10 seconds** (Gustafson-Munro, 1985; Johnston *et al*., 1987; Olie, 1990; Mutti *et al.*, 1998)	**10-12 sec** (Gustafson-Munro, 1985; Henderson & Sugden, 1992; Meaney, 1993)

In the case of the 3 year olds, no cut-off point was established for the minimum quantitative score as the average ability of balancing on one leg reported for 3 year olds is 1-3 seconds, or "momentarily" to 3 seconds (Olie, 1990: 13; Meaney, 1993: 21; Gallahue & Ozmun, 1995: 241). As the 3 year olds could therefore not score lower than this minimum value, a score higher than 3 seconds was used as a cut-off point in order to determine the percentage of 3 year olds scoring above average for their age.

According to Gallahue (1996), 2-3 year olds are usually in the initial stage, 4-5 year olds in the elementary stage and 6-7 olds in the mature stage of motor development. The developmental stage that a subject should usually be in at his/her age, as above, was used as a cut-off point. For instance, if the one leg balance of a 6 year old was classified as being in the elementary stage, the qualitative score for the skill was considered *below average* and was recorded as such. Again, no cut-off point was established for the qualitative scores of the 3 year olds, as children are usually in the initial stage at this age (Gallahue & Ozmun, 1995: 83) and no lower score than (*1*) could be awarded. In this case, a score higher than (*1*) was used as a cut-off point in order to determine the percentage of 3 year olds scoring above average for their age in the qualitative assessment.

DATA ANALYSIS

All calculations were done using the Statistica computer program (Statsoft, 1995). The results of the quantitative and qualitative assessments of every subject were classified as *below average* or *average or above average* according to the cut-off points as explained above. A 2-way frequency table (Table 3) was drawn up to show the frequencies of subjects scoring *below average* or *average or above average* in four possible combinations of the quantitative and qualitative scores. The Pearson Chi-square as well as the Phi for 2-way tables was also calculated for each age group to determine the significance of the relationship, if any, between the quantitative and qualitative scores. If a $p \leq 0.05$ was found, the Chi square (C) was interpreted using the following criteria: ES>0.2 constituted a small effect of practical significance; ES>0.5 constituted a medium effect, and ES>0.8

constituted a large effect (Steyn, 1999: 3). Data of the 3 year olds were not analyzed in this manner.

A cross-sectional box plot graph was also drawn up to compare the developmental curves of quantitative and qualitative development of the subjects.

RESULTS

The frequencies of the subjects' levels of quantitative and qualitative scoring are presented in Table 3 and Table 4. From Table 3 it can be seen that the 5 year old group showed the highest percentage of subjects scoring *below average* in the quantitative assessment (39.66%, left leg and 31.03%, right leg), followed by the 6 year old group (27.47%, left leg and 25.27%, right leg) and the 4 year old group (5.48%, left leg and 9.59%, right leg). In the qualitative assessment, the 6 year old group showed the highest percentage of subjects scoring *below average* for their age (17.59%, left leg and 25.28%, right leg), followed by the 5 year old group (7.76%, left leg, 7.77%, right leg) and the 4 year old group (6.85%, left leg; 6.85% right leg).

TABLE 3. **PERCENTAGES OF *BELOW AVERAGE* AND *AVERAGE OR ABOVE AVERAGE* QUANTITATIVE AND QUALITATIVE SCORES FOR THE ONE LEG BALANCE OF 4-6 YEAR OLD SUBJECTS (N=353)**

Age group	QUANTITATIVE (seconds) *Average or Below average above average* %		QUALITATIVE (stage) *Average or Below average above average* %	
4 years (*n*=146)				
L	5.48	94.52	6.85	93.15
R	9.59	90.41	6.85	93.15
5 years (*n*=116)				
L	39.66	60.34	7.76	92.24
R	31.03	68.97	7.77	92.23
6 years (*n*=91)				
L	27.47	72.53	17.59	82.41
R	25.27	74.73	25.28	74.72

L = score for balancing on left leg; R = score for balancing on right leg

From Table 4 it is clear that relatively few subjects (4.11% - 13.19%) scored *below average* in both the quantitative and qualitative assessments, while the percentages of subjects scoring *below average* in the quantitative but *average or above average* in the qualitative assessment ranged from 1.37% to 31.90%. Subjects scoring *below average* in the qualitative assessment but *average or above average* in the quantitative assessment, ranged from 0.00 – 13.19%, while subjects scoring *average or above average* in both assessments ranged from 60.43% - 91.78%.

Of the 4 year old subjects, 91.78% (left leg) and 89.04% (right leg) scored *average or above average* ($\geq$2 seconds and in the elementary stage of development) in the quantitative and

qualitative assessment of the one leg balance. Only 60.34% (left leg) and 68.96% (right leg) of the 5 year olds obtained *average or above average* scores ($\geq$8 seconds and in the elementary stage) in both types of assessments, while only 68.13% (left leg) and 61.54% (right leg) of the 6 year olds were at or above the cut-off points ($\geq$10 seconds and in the mature stage).

TABLE 4. **PERCENTAGES OF 4-6 YEAR OLD SUBJECTS (N=353) SCORING *BELOW AVERAGE* AND *AVERAGE OR ABOVE AVERAGE* FOR THEIR AGE IN DIFFERENT COMBINATIONS OF THE QUANTITATIVE AND QUALITATIVE SCORES FOR THE ONE LEG BALANCE.**

	QUANTITATIVE *% Below average* and QUALITATIVE *% Below average*	QUANTITATIVE *% Below average* and QUALITATIVE *% Average or above average*	QUANTITATIVE *% Average or above average* and QUALITATIVE *% Below average*	QUANTITATIVE *% Average or above average* and QUALITATIVE *% Average or above average*
4 years				
L	4.11	1.37	2.74	91.78
R	5.48	4.11	1.37	89.04
5 years				
L	7.76	31.90	0.00	60.34
R	7.77	23.28	0.00	68.96
6 years				
L	13.19	14.29	4.40	68.13
R	12.09	13.19	13.19	61.54

L = score for balancing on left leg; R = score for balancing on right leg

The Chi-square and Phi scores for the obtained relationships between the qualitative and quantitative frequencies are shown in Table 5. Statistically significant correlations were found between the quantitative and qualitative scores of the 4 year olds; 5 year olds and 6 year olds, where $p \leq 0.05$. The effect sizes measuring the relationship as determined by the Phi-score, showed a large effect for the 4 year olds (ES>0.8), but only small effects in the 5 and 6 year olds (ES>0.2) (Steyn, 1999: 3).

TABLE 5. **CHI-SQUARE AND PHI–SCORES FOR QUANTITATIVE AND QUALITATIVE SCORES OF 4-6 YEAR OLD SUBJECTS**

	4 years		5 years		6 years	
	L	R	L	R	L	R
Pearson Chi-square	132.842	123.275	8.797	12.137	22.008	8.288
Degrees of freedom	1	1	1	1	1	1
P-level ($p \leq 0.05$)	0.000*	0.000*	0.005*	0.000*	0.000*	0.003*
Phi for 2x2 tables	0.954	0.918	0.275	0.323	0.491	0.302

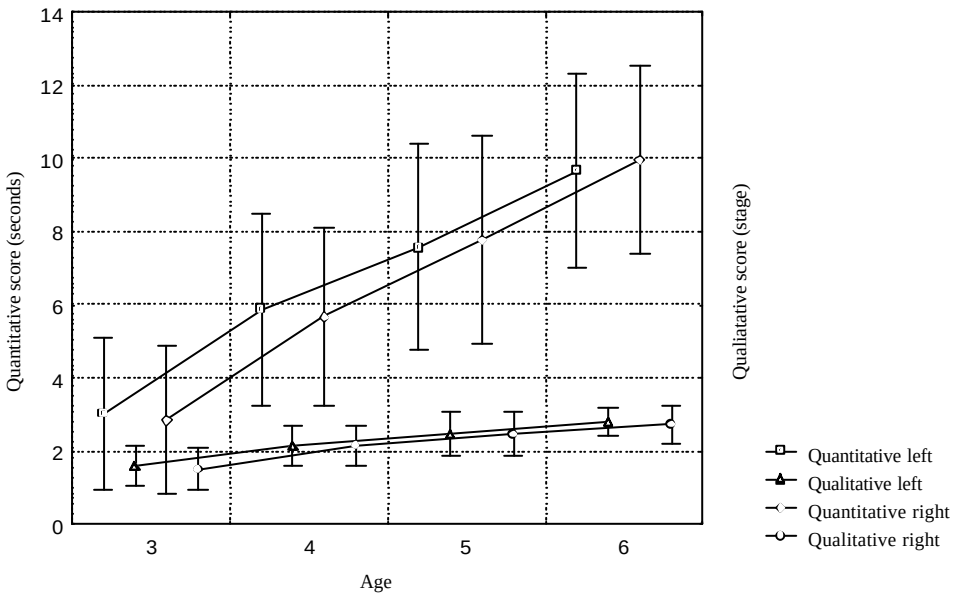

FIGURE 1. **CROSS-SECTIONAL DEVELOPMENTAL CURVES OF QUANTITATIVE AND QUALITATIVE SCORES FOR THE ONE LEG BALANCE (LEFT AND RIGHT LEG) IN 3-6 YEAR OLD CHILDREN**

For the 3 year olds, only a 2-way frequency table was drawn up to show the frequencies of subjects scoring *average* (1-3 seconds and in the initial stage) or *above average* (above 3 seconds and in the elementary stage) in the quantitative and qualitative assessments. This analysis indicated that 44.10% of the 3 year olds scored *above average* in the qualitative assessment and *average* in the quantitative assessment of both the left and the right leg, thus almost half of this age group complied to developmental criteria of the elementary stage. A percentage of 31.29% produced *above average* scores in the quantitative, but *average* scores for the qualitative assessment of balancing on the right leg, and 36.75% had the same scores on the left leg.

Figure 1 shows the developmental curves of mean quantitative and qualitative scores across the ages of the subjects can be observed. An upward tendency in quantitative as well as qualitative scores across all the ages is clear, indicating ongoing developmental trends to the age of 7 years.

DISCUSSION

The results show that the qualitative and quantitative development of this selected South African group of 3-6 year old children compares well to the qualitative developmental criteria of the stage classifying system of Gallahue and Ozmun (1995) and to quantitative norms found in the literature (Gustafson-Munro, 1985: 15; Johnston *et al*., 1987: 159; Olie, 1990: 13; Henderson & Sugden, 1992: 52; Mutti *et al*., 1998: 68). While the largest percentages of the

subjects in each age group produced *average or above average* scores in both the quantitative and qualitative assessments, though, a noteworthy tendency was established in the percentage of scores across the ages in the qualitative scores. The percentage of subjects scoring *average or above average* become less as their age increase, while the subjects falling in the category for quantitative scores *below average* but qualitative scores *average or above average*, increase from 4 years to 6 years. The percentages of subjects failing to score above the cut-off points in both types of assessments also increased from 4 to 5 and 6 years. This is an alarming tendency, as it would seem to indicate that the static balance skills of this group deteriorate as the subjects age. As balance is considered to play a primary role in the development of all gross motor skills, these results may be indicative of the same kind of tendencies in the development of other gross motor skills of this group. However, this is only an observation and further research exploring this phenomenon could therefore be of much significance.

The largest percentages of subjects in all the age groups were found in the category for the *average or above average* quantitative as well as qualitative scores. These results suggest that there is a correlation between the quantitative norms and the developmental criteria used in this study. This relationship is clearly illustrated in the linear upward curve of both types of assessment scores in Figure 1, while the established Chi-square and Phi values also act as confirmation. The established relationship was especially strong among the 4 year olds.

The qualitative and quantitative development of the 3 year old group compares well to the norms and criteria found in the literature (Olie, 1990: 13; Meany, 1993: 21; Gallahue & Ozmun, 1995: 241), as almost half of this group (44.10%) scored higher than the qualitative score accepted as average (1-3 seconds) for this age. As these results suggest that that large percentages of subjects in the other age groups might also have scored above the age-appropriate norms and criteria, a further analysis was done to determine the prevalence of such scores in the 4 and 5 year old age groups. From this it was established that 8.90% (left leg) and 8.22% (right leg) of the 4 year olds (above 7 seconds and in the mature stage of development); 30.17% (left leg) and 29.31% (right leg) of the 5 year olds (above 10 seconds and in the mature stage) scored higher than the upper limits of the average quantitative and qualitative scores for their age. However, further research on the appropriateness of these norms for 3, 4 and 5 year olds in South Africa is advised.

No 5 year old subject fell into the category of qualitatively *below average* and quantitatively *average or above average* scores, the reason being that falling into this category would have meant that the subject balanced for 8 seconds but were classified as being in the initial stage. The qualitative criteria for the initial stage excluded any possibility of balancing for that long.

The relatively high percentage of 6 year olds scoring *below average* in the quantitative assessment (27.47% for the left leg and 25.27% for the right leg) is of concern, as this is the age at which school readiness is tested for in South Africa (Steenhuizen *et al.*, 1994). These figures do not necessarily indicate developmental deficits or disorders, as the developmental stages often overlap and considerable variance is found in the rate of gross motor development of young children (Gallhue & Ozmun, 1995: 226). They do, however, resemble the prevalence for motor deficits or disorders estimated in South African children of 5-15% (Pienaar, 1994: 125). In this regard, a further analysis was done to determine the percentage of 6 year old children scoring below the norms and criteria set for 5 year olds in the one leg balance (< 8 seconds and in the elementary stage of development). This analysis showed that

between 18.68% (left leg) and 18.74% (right leg) of this group could not attain the norms and criteria appropriate for 5 year old children. As the assessment of the one leg balance forms part of the screening test for school readiness (Steenhuizen *et al.*, 1994: 34), below average balancing ability could influence the scoring of 6 year olds in this test.

CONCLUSION

The results of this study should be interpreted in the light of the following limitations. Although a large group of children participated in this study, a non-randomized group was used, minimizing the generalizability of the results. These children mostly came from a white and middle or higher socio-economic background. Different results might be found if a randomly chosen group, from all socio-economic backgrounds, were used. The enrollment of the children in the movement development program might also be a reflection of the parents' consciousness of the importance of stimulating their children, and this could also effect the current status of the motor development of these children. Future research, taking this limitation in consideration, is recommended.

Secondly, it was not possible to fit all the children who were assessed, precisely into the three-stage progression of Gallahue and Ozmun (1995). For research and practical purposes, the developmental aspects of the one leg balance may be more completely described in a five-stage sequence, as some children showed characteristics of both the previous and the present stage of the one leg balance that they were finally classified at. Further research is therefore recommended on the defining of developmental criteria for the purpose of classifying children into 5 stages (initial stage, transitional stage between the initial and elementary stage, elementary stage, transitional stage between the elementary and mature stage, and mature stage) of development in the one leg balance. Furthermore, one characteristic observed in this study that might be added to the criteria of the one leg balance, was that overcompensation for balance loss seemed to come in "bursts" that became less prevalent as the children's ages increased. The 3 year olds (initial stage), for example, seemed to overcompensate with their arms and body movements to adjust to losing their equilibrium, in such a burst that they lost their balance completely to the other side. The six year olds (mature stage) compensated in more subtle, fluent movements with their arms and trunk. This observation is consistent with the findings of Williams *et al.* (1983) in their study of static postural control in young children.

A correlation was found between quantitative and qualitative scores in every age group, although the practical significance of the effect was small in the 5 and 6 year old groups. Additionally, as seen in Figure 1, there is an upward tendency in both the quantitative and the qualitative scores across ages, thus as the quantitative scores increase, so do the qualitative scores. These results suggest that the qualitative developmental stages of the one-leg balance can be used as an additional form of assessment together with the quantitative assessment. The results has also shown that a child will not necessarily exhibit good qualitative scores and simultaneously show good quantitative scores in tests for static balance, indicating that balance problems could be identified that might not otherwise have been done through a quantitative or a qualitative assessment alone.

The percentage of subjects failing to adhere to the cut-off points are relatively high to the opinion of the authors. Further research is recommended with regard to the quantitative and

qualitative assessments of other fundamental gross motor skills, as these balance assessment scores might be an indication of similar tendencies in other gross motor skills. Further research on the age-appropriateness (for South African children) of the quantitative norms and qualitative criteria used in this study which are commonly used in test batteries and screening tests (Gustafson-Munro, 1985; Henderson & Sugden, 1992; Mutti *et al*, 1998; Goshi *et al*., 1999) could also be valuable to professionals working with young children. As differences between male and female children have been reported in the literature (Hands & Larkin, 1997: 13; Van Gelder & Schweitzer, 1999: 31), further research on the differences between the sexes with regard to quantitative and qualitative assessment of the one leg balance could also give a more complete picture with regard to gender differences.

In conclusion, it can be stated that in order to get a complete picture of a child's static balance skills, especially for screening and diagnostic purposes, it is possible, and even necessary, to do both a quantitative and a qualitative assessment based on age-appropriate norms and developmental stage criteria.

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Me. Doritea du Toit; Skool vir Biokinetika, Rekreasie en Sport Wetenskap, Potchefstroomse Universiteit vir Christelike Hoër Onderwys, Potchefstroom 2531, Republiek van Suid-Afrika. Tel. +27 (0)83 469-1699 (w), +27 (0)18 299-6632 (h), Faks. +27 (0)18 299-1697, E-pos: opliadt@potch1.agric.za

(*Vakredakteur: Prof. P.E. Krüger*)