

# ESTUDOS EM DESENVOLVIMENTO MOTOR DA CRIANÇA XVI

MOTOR DEVELOPMENT  
STUDIES OF THE CHILD XVI



Eds.  
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O XVIII Seminário do Desenvolvimento Motor em Crianças (XVIII SDMC) procura, assim, abordar questões práticas e refletir sobre aspetos conceptuais para que os especialistas deste ramo do saber estejam bem preparados para enfrentar os problemas da aprendizagem, do desenvolvimento e do controle motor.

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## AFFORDING SELF-HEADING IN PRESCHOOL AND CLUB CHILDREN

### PROPICIACÃO DO AUTOCABECEAMENTO EM CRIANÇAS DO PRÉ-ESCOLAR E DE ESCOLINHAS DE FUTEBOL

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#### Summary

Heading is an identity skill of European football, that requires a balance between physical safety and acquisition, achievable through balloons with minimal impact and slow approach. This study aimed to investigate whether preschool children (P) (N=44, M=3.91±0.87 years, ♀=24) can perform self-heading using this educational solution and whether they demonstrate a performance similar to boys in football schools (F) (N=14, M=4.57±.65 years). They were asked to perform as many consecutive self-headings as possible with a balloon, in 3 trials, without attempt restrictions. The balloon afforded to head in 3-years-old, without gender differences, reinforcing the importance of equal gender opportunities for practice. A transition is observed from 3 to 4 years, with an increase in frequency and a reduction in the time between headings. At 4 and 5 years old, the F performs better than the P. In both groups, individualized motor competence occurred. The balloon should be used to explore heading in children aged 3, with advantages in P, compared to the limited recruitment capacity found in group F. The age of 3 years may be characterized as the beginning of the sensitive period for the acquisition of heading.

**Keywords:** Self-headings; football; children; sensitive period; gender.

#### Resumo

O cabeceamento é uma habilidade identitária do futebol europeu, e carece de conciliação entre segurança física e aquisição, obtido com balões, com impacto quase nulo e aproximação lenta. Este estudo objetivou investigar se crianças do pré-escolar (J) conseguem realizar autocabeceamentos através desta solução didática (N=44, M=3,91±,87 anos, ♀= 24), e se apresentam uma prestação similar a meninos de escolinhas de futebol (E) (N=14,

M=4,57±,65 anos). Foi-lhes pedido que realizassem o máximo de cabeceamentos consecutivos com um balão, por 3 ensaios, sem restrições de tentativas. O balão propiciou cabecear a partir dos 3 anos, sem diferença entre géneros, reforçando importância de igualdade nas oportunidades de prática. Dos 3 para os 4 anos, observa-se uma transição, com aumento da frequência e redução de tempo entre cabeceamentos. Nos 4 e 5 anos, as E revelam melhor prestação. Em ambos os grupos, há expressão de individualizada competência motora. O balão deve ser usado para cabecear a partir dos 3 anos de idade, com vantagens no J, comparativamente com a limitada capacidade de recrutamento nas E. Três anos de idade poderá ser o início do período sensível para a aquisição do cabecear.

**Palavras-chave:** Autocabeceamento; futebol; crianças; período sensível; género.

## INTRODUCTION

The incidence and severity of head injuries in youth football are low; however, there is a warning for potential concussions (1). The heading is an identity and crucial motor skill in European football. Since childhood is a critical period for acquiring foundational motor skills (2), it is necessary to balance the safety of a developing body with the need to facilitate the acquisition of this skill, rather than excluding it during the first ten years of sports training (3). Catela et al. (4) explored self-heading in 4-6-year-olds, for practitioners and non-practitioners, of both genders. The lightweight and slow pace of the balloon facilitated self-heading for non-practitioners, without gender differences, with a progressive increase in the frequency and a reduction in the time between self-headings. In motor development, a sensitive period is considered the most favorable time window for the acquisition of a specific skill, during which certain capacities are readily shaped or altered by experience. This time window depends on the interaction between practice opportunities and individual maturation processes (5); e.g., the ability to perceive depth requires early experience of binocular vision (6), which is essential for appreciating the distance of an approaching object, as in the case of heading. In this study, we investigated whether preschool children (P) can perform self-heading using a balloon, and if they demonstrate a performance similar to boys in football schools.

## METHODOLOGY

### Sample

Participated 44 non-practitioners preschooler children (P) (3 years = 19, 8 ♀; 4 years = 12, 6 ♀; 5 years = 13, 9 ♀), and 13 boys from football academies (F) (4 years = 4; 5 years = 9). Informed consent and assent were obtained.

## Instrument, Protocol, and Procedures

The children were asked to perform as many consecutive self-headings as possible with a balloon, in 3 trials, without attempt restrictions for at least 1 heading (4). Time (seconds) (T), frequency of attempts (A) and consecutive headings (H), and average time per heading (seconds) (HT) were obtained.

## Statistical Treatment

IBM-SPSS 27 was used. For normality of data distribution, Shapiro-Wilk test was used. For associations, Spearman correlation ( $\rho$ ) with a 95% confidence interval (CI), with equal sign, was used. For between-group comparisons, were used Kruskal-Wallis test (H), with Bonferroni correction; and, the Mann-Whitney test (Z), with Monte Carlo post-hoc test, with estimation of Cohen's  $d$  ( $d$ ). For within-group comparisons, were used Friedman test, with Bonferroni correction; and, Wilcoxon test (T), with Monte Carlo post-hoc test, with estimation of Cohen's  $d$  ( $d$ ). Probability at .05, two-tailed.

## RESULTS

### Preschool

No significant differences between genders were found. At 3 years, 1 boy and 1 girl were unable to complete any headings, and 1 girl only managed to do it in the 1<sup>st</sup> trial; at 4 years, 1 girl never succeeded. It was found several associations between the A, H and HT by trials for the 3-year-olds preschoolers (Table 1), 4-year-olds preschoolers (Table 2), and 5-year-olds preschoolers (Table 3). The age groups showed differences in the H across all trials (1<sup>st</sup> trial:  $H(2)=7.898$ ,  $p=.019$ ; 2<sup>nd</sup> trial:  $H(2)=8.231$ ,  $p=.013$ ; 3<sup>rd</sup> trial:  $H(2)=13.4$ ,  $p<.001$ ). Specifically, the 3-year-olds performed fewer H than the 5-year-olds in all trials (1<sup>st</sup> trial:  $Z(32)=2.718$ ,  $p=.005$ ,  $d=1.1$ ; 2<sup>nd</sup> trial:  $Z(32)=2.77$ ,  $p=.006$ ,  $d=1.12$ ; 3<sup>rd</sup> trial:  $Z(32)=3.243$ ,  $p<.001$ ,  $d=1.4$ ). Additionally, the 4-year-olds performed fewer H than the 5-year-olds in the 1<sup>st</sup> trial ( $Z(31)=2.046$ ,  $p=.041$ ,  $d=0.79$ ) and in the 3<sup>rd</sup> trial ( $Z(31)=2.906$ ,  $p=.003$ ,  $d=1.22$ ).

**Table 1.** Associations between A, H and AH for 3-year-olds preschoolers.

	A <sup>1st</sup>	A <sup>2nd</sup>	H <sup>1st</sup>	H <sup>2nd</sup>	H <sup>3rd</sup>
H <sup>1st</sup>	rho=.480, p=.037, CI .019; .773			rho=.634, p=.004, CI .239, .849	
H <sup>2nd</sup>		rho=.498, p=.019, CI .091; .801	rho=.634, p=.004, CI .239, .849		rho=.721, p<.001, CI .394, .888
H <sup>3rd</sup>				rho=.721, p<.001, CI .394, .888	
HT <sup>3rd</sup>					rho=-.621, p=.01, CI -.858, -.165

**Notes:** A- frequency of attempts; H- consecutive headings, HT - average time per heading, <sup>1st</sup> - first trial, <sup>2nd</sup> - second trial, <sup>3rd</sup> - third trial.

**Table 2.** Associations between A, H and AH for 4-year-olds preschoolers.

	A <sup>1st</sup>	A <sup>2nd</sup>	H <sup>1st</sup>	H <sup>2nd</sup>	H <sup>3rd</sup>	HT <sup>1st</sup>
A <sup>3rd</sup>	rho=.640, p=.025, CI .086, .892	rho=.739, p=.006, CI .268, .925				
H <sup>1st</sup>				rho=.646, p=.023, CI .096, .894	rho=.839, p<.001, CI .497, .955	
H <sup>2nd</sup>			rho=.646, p=.023, CI .096, .894		rho=.624, p=.03, CI .058, .886	
H <sup>3rd</sup>			rho=.839, p<.001, CI .497, .955	rho=.624, p=.03, CI .058, .886		rho=-.664, p=.026, CI -.908, -.087
HT <sup>1st</sup>						rho=-.664, p=.026, CI -.908, -.087
HT <sup>2nd</sup>				rho=-.788, p=.004, CI -.945, -.338		
HT <sup>3rd</sup>				rho=-.827, p=.002, CI -.956, -.435	rho=-.708, p=.015, CI -.921, -.167	rho=.630, p=.038, CI .027, .897

**Notes:** A- frequency of attempts; H- consecutive headings, HT - average time per heading, <sup>1st</sup> - first trial, <sup>2nd</sup> - second trial, <sup>3rd</sup> - third trial.

**Table 3.** Associations between A, H and AH for 5-year-olds preschoolers.

	H <sup>1st</sup>	H <sup>3rd</sup>
HT <sup>1st</sup>	rho=-.889, p<.001, CI -.968, -.652	
HT <sup>3rd</sup>	rho=-.836, p<.001, CI -.951, -.516	

**Notes:** A- frequency of attempts; H- consecutive headings, HT - average time per heading, <sup>1st</sup> - first trial, <sup>2nd</sup> - second trial, <sup>3rd</sup> - third trial, all - all trials.

### Football Academies

Between the ages of 4 and 5, there were no significant differences in weight, height, BMI, experience time, and dependent variables. There was no significant change in performance across the 3 trials. In the 1<sup>st</sup> trial, participants with more experience time, performed more H (rho=.632, p=.021, CI .106, .881). It was also found several associations between the A, H and HT by trials (see Table 4).

**Table 4.** Associations between A, H and AH for 4 and 5-year-olds football academy trainees.

	A <sup>1st</sup>	A <sup>2nd</sup>	H <sup>1st</sup>	H <sup>3rd</sup>	HT <sup>1st</sup>
A <sup>2nd</sup>	rho=.866, p<.001, CI .591, .961				
A <sup>3rd</sup>	rho=.627, p=.022, CI .098, .880		rho=.776, p=.002, CI .378, .932		
H <sup>1st</sup>	rho=-0.584, p=.036, CI -.864, -.031			rho=.622, p=.023, CI .090, .878	rho=-.577, p=.039, CI -0.861, -.019
H <sup>3rd</sup>			rho=.622, p=.023, CI .090, .878		
HT <sup>1st</sup>			rho=-.577, p=.039, CI -0.861, -.019		
HT <sup>3rd</sup>				rho=-.615, p=.025, CI -.875, -.078	rho=-.564, p=.045, CI .0, .856

**Notes:** A- frequency of attempts; H- consecutive headings, HT - average time per heading, <sup>1st</sup> - first trial, <sup>2nd</sup> - second trial, <sup>3rd</sup> - third trial.

### Both Groups (4 and 5 years)

The participants in F significantly performed more H in all trials (1<sup>st</sup> trial: t=2.342, p=.016, d=1.07; 2<sup>nd</sup> trial: t=3.596, p<.001, d=1.44; 3<sup>rd</sup> trial: t=1.995, p=.044, d=.68) (see Table 5), and had less HT in the first 2 trials (1<sup>st</sup> trial: t=2.49, p=.011, d=.88; 2<sup>nd</sup> trial: t=2.938, p=.002, d=1.08).

**Table 5.** Descriptive statistics (mean±sd, minimum, maximum) of H and HT, in the 3rd trial, per age and group (P,F).

Age	H - P	H - F	HT - P	HT - F
3	1,32±1,0, 0, 4	-	5,0±5,35, 2, 13	-
4	4,0±3,77, 0, 14	5,0±5,35, 2, 13	2,52±,66, 1,75, 4,0	2,25±,96, 1,0, 3,0
5	3,54±2,57, 1, 10	9,11±6,7, 2, 22	3,08±1,2, 1,14, 5,0	2,03±,26, ,86, 3,0

**Notes:** H- consecutive headings, P- preschooler children, F- football academies children, HT- average time per heading.

## DISCUSSION

The lightweight and slowness of the balloon provided an opportunity to explore the heading ability in 3-year-old children, without differences between genders, even for non-practitioners, eliminating the risk of potential head injuries (4, 7), and ensuring it at the beginning of a probable sensitive period for the acquisition of a motor skill with a strong coordinative component (2), although there may be a small percentage of children who have not yet reached it. The absence of differences between genders reinforces the importance of equal opportunities for practice. From 3 to 4 years old, a transition is observed, with an increase in frequency and a reduction in time between headings, i.e., with lower trajectories, hence, with a lower probability of spatial error, but requiring a quicker adjustment to the object's trajectory. This developmental pattern is supported by individual motor competence, but it does not deny the difference between practitioners and non-practitioners. The introduction of heading exploration in preschool can support the exploration and refinement of a foundational motor skill, which may evolve into a specific motor skill, in both genders and starting from 3 years of age. At each age, individual performance differences are evident and appear to have been maintained throughout the 3 trials.

## CONCLUSION

The balloon provided an opportunity to explore self-heading since 3-year-old children.

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