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ASSISTÊNCIA DOMICILIAR NA PREVENÇÃO DE QUEDAS EMELHORIA DA QUALIDADE DE VIDA EM IDOSOS: REVISÃO INTEGRATIVA

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ABSTRACT

Perceptual manipulation in the visual field, when observing the effect of retinal manipulation, can be extremely important in creating changes in the swimmer's body perception and technique. The aim of this study was to observe and understand the role restriction has in swimming ability (Partial glasses occlusion - restriction in the body) and can influence the variant and invariant aspects of crawl swimming. Beginners swimmers of both genders (13 to 15 years old, n=20) were evaluated in a 50-meter stretch in both underwater and air phase without visual restrictions and, later, with visual restrictions (Convergent Foramen, Divergent Foramen, Upper Field, Lower Field). The results were analyzed in both absolute and relative values. The biological maturation was obtained through the somatic maturation indicator. The variable that showed significant difference between the type with restriction and without restriction was the Converged Foramen (CF), both for relative (p= 0.023) and absolute values (p= 0.006). However, both differences, although significant, had a very small sized effect (d= -0.029 and d= -0.142 respectively) as well as negative. In conclusion the restriction by CF may cause significant changes in the technique of young swimmers.

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INTRODUCTION

Swimming, as a motor activity, has been practiced by the world population for a long time, recreationally, for leisure as well as competitively (Pelayo, 2002; Brito, 2008). In the literature on the subject, the emphasis is on excelling in physical fitness (Neiva, Morouço, Pereira, and Marinho, 2012) when compared to motor fitness (Brito, 2008; Zatónand Szczepan, 2014; Freudenheim, 2010; Figueiredo, Pendergast, Vilas-Boas and Fernandes, 2013). Regarding the motor aptitude, adjustments related to the movements are well described in the literature (Cholet, ChaliesandChatard, 2000; Seifert, Cholet andBardy, 2004; Apolinario, Oliveira, Ferreira, Basso, Correa andFreudenheim, 2012; Silva, Figueiredo, Morais, Vilas-Boas, Fernandes and Seifert, 2019; Guignard, Rouard, Chollet, Bonifazi, Dalla Vedova, Hart and Seifert, 2019) and, in summary, it can be observed that there are indicators that are determinant in performance, as is the case of motor coordination. In swimming, motor coordination can be defined by taking advantage of the propulsive phases (in the water) in comparison to the non-propulsive phases (out of the water) by the swimmer and understood from its coordinating structure. However, some research (Barbosa, 2016; Chollet *et al*, 2000; Freudenheim, Basso, Xavier Filho, MadureiraandManoel, 2005) has reported that there are significant differences between beginners swimmers (low skill) compared to experienced swimmers (high skill), although they do not take into account intrinsic feedback, in the specific case of vision, which could also corroborate the differences between these swimmers, even though the literature discusses motor coordination in high skill swimmers (Chollet *et al*, 2000; Seifert *et al*, 2004; Silva *et al*, 2019; Guignard *et al*, 2019). In addition to this, there is a need to control the effects of biological maturation, which can cause coordinative disturbances when there is a difference in stages (Malina, Bouchard and Bar-Or, 2004). Thus, the objective was to observe and understand how the role of restriction on swimming ability (partial glasses occlusion - visual feedback) can influence the variant and invariant aspects of *crawl* swimming.

MATERIALS AND METHODOLOGY

Research Design: The nature of the research was direct and descriptive (with emphasis on exploratory study), with quasi-experimental method. Cross-sectional characterization and designed in series of time (Thomas, Nelson and Silverman, 2012).

Participants, placement and criteria for exclusion: The sample was characterized as usual, aged 13 to 15 years (n=20, SD±0.65), autonomous, who took swimming classes at the Department of Sport and Tourism (DETUR) of São Caetano do Sul - SP, being held at the Aquatic Complex Leonardo Speratte, at the improvement phase, 5 to 6 times a week, with an average training volume of 18 km per week. Parents or guardians were aware of the work that was being done and signed the Informed Consent Form, as the students signed the Consent Form, according to resolution 196/96, under No. 1.997.701 of the Committee of Ethics and Research of the Municipal University of São Caetano do Sul (USCS). Volunteers who were considered excluded from this sample: a) refused to participate in the study; b) presented any physical problem that could temporarily or permanently prevent their involvement in the performance of the evaluation procedures; c) absence on the day of data collection (pool tests).

Techniques and Procedures: The Ultrak495 100-memory chronometer was used to record the time covered in the 50 meters. It was filmed by two cameras (Go Pro Hero 3), phase A (underwater) and phase B (aerial), which were fixed on a cart. They slid up and down a 23 meter long track and were moved with the help of one person.

Determining the Critical Velocity: Critical Speed (CS) is the highest intensity exercise that can be maintained for a long time without exhaustion (Raimundo, Turnes, Lisbôa, de Oliveira, Pereira and Caputo, 2017. For the determination of the CS, maximum sprints took place in the distances of 200 and 400 meters *crawl*, respective times were recorded (to the hundredths of seconds); sprints took place at the starting block with the "prepare - go" command by the evaluator. The sprints were performed on different days, in order to insure the best performance. The CS was determined by the slope (b) of the linear regression line between the distances and their respective times obtained in each repetition.

Test Application: The tests were performed in the 50-meter indoor heated pool (26° C to 27.5° C) all year round. The volunteers swam 50-meter *crawl*, after critical speed (CS) was determined, with an interval (after everybody finished each restrictive task).

Disturbance in swimming synchronicity: Disturbance in swimming synchronization was performed so that light emitted in the retina forms the configuration according to the level of complexity. The complexity followed the logic of light restriction through the occlusion of swimming goggles (Brito, 2008). Therefore, each volunteer experienced an equal situation of light restriction at each moment in their retinas (Application of the principle of perceptual constant). When we restrict part of the light (restriction: Convergent Foramen, Divergent Foramen, Upper Field, Lower Field), or it completely, as we put on the glasses, it prevents objects from being reflected in our retina and, in effect, causes changes in synchronization. It's worthy to mention that one does not see objects, but the light they reflect. These objects reflected in the retina are responsible for the actual behavior (proximal stimuli) and these may cause a change in direction. In swimming, this direction is emphasized as follows: as one works for intentional synchronization, one should insist on the direction of the upper (horizontal) visual field when the swimmer is swimming. That way, the lateral space seems to interfere negatively in performance when compared to the superior visual field, for example (Brito, 2008).

Stroke Cycle Analysis: The *crawl* stroke cycle has two phases: aquatic (propulsive phase) and air (non-propulsive phase), but in our study we analyzed only the propulsive phase. Total movement time corresponded to one stroke cycle. Times were obtained by counting the number of frames using Adobe Premiere Pro 2.0. With the total cycle length and the duration of each phase it was possible to calculate the relative timing of the phases. Relative timing consists of the percentage of total movement time (total cycle length) spent in each phase. For the purpose of this analysis we take into consideration three consecutive stroke cycles, performed in the intermediate stage of the displacement. This was done to prevent the effect that the start and finish of the stretch could have on the temporal organization of the stroke. Therefore, the measurements used in the present investigation are: (a) variant aspects of ability - distribution and variability of the absolute time of movement in the aquatic phase; (b) invariant aspects of ability - distribution and variability of relative timing in the aquatic phase.

Biological Maturation: The Biological Maturation Indicator (BMI) used was the somatic indicator according to the protocol of Mirwald *et al*. (Mirwald, Baxter-Jones, Bailey andBeunen, 2002). The somatic indicator is based on the equation proposed by the above authors and returns values, in years, related to the occurrence of Peak of Height Velocity (PHV). Therefore, the moment of occurrence of PHV is determined by the value = 0 years. Thus, the negative values resulting from the formula are interpreted as the number of years the individual presents at that time, before the occurrence of PHV. Conversely, positive values are interpreted as the number of years the individual presents at that time, after PHV occurs.

Statistical analysis: Descriptive analysis was applied to characterize the sample for the absolute and relative values of the variables. By comparing means, we were able to verify if there was a significant difference between the restricting variables and the unrestricting variable for both absolute and relative values. ANOVA was applied to verify differences for both absolute and relative variables adjusted by the biological maturation indicator to investigate the effect of biological maturation on the collected variables. For the variables that presented significant differences, the *effect size* test was applied using Cohen's D to determine the size of the effect on these differences, according to the references proposed by Cohen (Cohen, 1988). Measurements regarding variability were calculated using Pearson's coefficient of variability (CV) between attempts of the same subject, in order to avoid the effect of magnified measurements and thus enable comparisonThe statistical program used was the SPSS 18.0.

RESULTS

Table 1 shows the description of the anthropometric values of the study sample. There were no significant differences between genders in any of the analyzed variables. The results of the variant and invariant aspects were presented in relative values and absolute values, and in the descriptive statistics' means and standard deviation.

Table 1. Sample's descriptive analysis (mean and SD)

	Total		Girls		Boys	
	Mean	SD	Mean	SD	Mean	SD
Age (years)	13.300	±0.656	13.200	±0.632	13.400	±0.699
Weight (Kg)	56.240	±8.941	51.620	±7.950	60.860	±7.624
Height (cm)	165.100	±7.846	159.500	±5.739	159.500	±5.229
PHV (years)	0.460	±0.832	0.900	±0.547	0.961	±0.782

PHV= Peak of Height Velocity; SD: Standard Deviation.

Table 2. Variable's descriptive analysis (mean and SD) in absolute values

	Total		Girls		Boys	
	Mean	SD	Mean	SD	Mean	SD
Without restriction (s)	1.140	±0.156	1.096	±0.150	1.182	±0.153
Dominant Side (s)	1.150	±0.141	1.117	±0.124	1.182	±0.120
Lower Field (s)	1.140	±0.131	1.102	±0.133	1.191	±0.113
Upper Field (s)	1.170	±0.119	1.110	±0.098	1.227	±0.100
Divergent Foramen (s)	1.160	±0.114	1.103	±0.100	1.219	±0.111
Convergent Foramen (s)	1.150	±0.116	1.101	±0.106	1.192	±0.106

SD= Standard Deviation

Table 3. Variable's descriptive analysis (mean and SD) in relative values

	Total		Girls		Boys	
	Mean	SD	Mean	SD	Mean	SD
Without Restriction (%)	66.660	±3.464	65.725	±3.961	65.725	±2.775
Dominant Side (%)	67.860	±3.232	66.756	±3.132	66.756	±3.088
Lower Field (%)	67.120	±3.063	65.650	±3.394	65.650	±1.871
Upper Field (%)	66.890	±3.234	65.233	±3.272	68.584	±2.302
Divergent Foramen (%)	67.420	±3.704	65.658	±4.263	68.539	±1.980
Convergent Foramen (%)	67.550	±2.830	65.891	±2.878	69.176	±1.591

SD= Standard Deviation

Table 4. Significance and *effectsize* between absolute and relative variables with and without restriction

	Relative	Absolute
Dominant Side	0.292	0.099
Lower Field	0.665	0.233
Upper Field	0.341	0.163
Divergent Foramen	0.180	0.294
Convergent Foramen	0.023 (d=-0.029)	0.006 (d=-0.142)

These values can be observed in tables 2 and 3. By comparing the means and variables that presented a significant difference between the type with restriction and without restriction was the Converging Foramen (CF), for both relative ($p = 0.023$) and absolute values ($p = 0.006$). However, both differences, although significant, had a very small effect in size ($d = -0.029$ and $d = -0.142$ respectively) as well as negative (Table 4).

DISCUSSION

The main finding of the study was: CF demonstrated effectiveness as intrinsic feedback, both in absolute and relative values. Constraint is conceptualized as a factor that can define phenomenal behavior because all action is acquired and synchronized within a set of constraints. This set of constraints can come from the geographical setting (environment), the organism (swimmer) or the task itself (swimming). Since swimming is a modality that involves sensations and, through its different movements and techniques enable the practitioner to develop his synesthetic ability, that is, the knowledge of his own body in water (Brito, 2008; Szczepan, ZatónandKlarowicz, 2016; Geithner, Thomis, Eynde, Baes, Loos and Peters, 2004) we seek to understand how these sensations/perceptions could corroborate in this process. However, biomechanical (kinematic) aspects may be relevant at this stage of motor development, as they indicate the swimmer's ability, which is known in the national and international literature as the *Stroke Index*, as it can contribute to the performance (Filho, Gimenez and Júnior, 2003), although not analyzed in our study. Studies have verified that biomechanical aspects interfere with swimming performance (e.g.: energy expenditure), as well as propulsive efficiency (e.g.: increased amplitude in stroke cycle), which are fundamental factors for displacement in the aquatic environment (Freitas Filho, Lima, Lima, Cunha, Cunhaand Lima, 2018). Besides these aspects, some anthropometric and movement synchronization variables (relationship between air and underwater phases) are also related to the modality in question (Apolinario *et al*, 2012; Freudenheim *et al*, 2005). In this sense, it is necessary to verify in this age group the biological maturation. The somatic indicator has been explored since the proposition of the equation for calculation in 2002 (Mirwald *et al*, 2002) and advanced in numbers of studies in the literature using such procedure (Latt, Jurimae, HJaljaste, Cicchella, Purge andJurimae, 2009; Malina, Claessens, Van Aken, Thomis, Lefevre andPhilippaerts, 2006). In the present study, biological maturation as a factor of ANOVA had no significant effect on the collected variables, it was not an intervening factor in the results.

This may be justified by the fact that the sample is almost entirely within the same classification range according to the PHV. In our case, the sample was at the moment of PHV occurrence, which generates homogeneous behaviors (Doncaster, Igaand Unnithan, 2018; Read, Oliver, Myers and Ste Croix, 2018). In the present research, swimmers swam at a controlled speed, called Critical Speed (CS) (Raimuindo *et al*, 2017), at all times of restraints, so each swimmer had to establish a swimming strategy to swim a distance of 50 meters with restrictions and maintain their times. It was performed after the evaluators' signal, for each attempt (Unrestricted, Dominant Side, Upper Field, Lower Field, Converged and Divergent Foramen), being informed what time to keep, as well as feedback at the end of 50 meters in CS. However, we found significant changes in Converging Foramen (CF) for both relative and absolute values ($p= 0.023$ and $p= 0.006$), respectively. However, both differences, although significant, had a very small sized effect ($d= -0.029$ and $d= -0.142$ respectively) and negative (*Table 4*) when comparing the constraints (Unrestricted to Convergent Foramen). However, it appears that certain restrictions could affect the temporal organization of the crawl swim. We can hypothesize that these implications could corroborate a new mental representation for these swimmers, thus improving the way to solve motor problems in future situations. An indicator of this mental representation pointed out in the literature (Freudenheim, 2010; Apolinario *et al*, 2012; Freudenheim *et al*, 2005) has been described as relative timing. Relative timing has been considered a good indication of the temporal organization of motor behavior, as it remains relatively constant even in the face of changes in action. For example, increased movement speed, increased range of motion, selection of different muscle groups, among other aspects. However, relative timing should be considered in conjunction with absolute time, as the former is invariant only in view of the latter's greater variability.

Therefore, in this study, we considered the need to use relative timing and absolute time as indicative of the temporal organization of the action, but only the propulsive phase was analyzed, since this phase is relevant to the swimmer's displacement, when compared to air phases. There is also consistency between moments without restriction when compared to moments with restriction (CF), it went from 5.2% to 4.2%, respectively. Therefore, it seems that without verbal feedback (Zatón *et al*, 2014) swimmers are adjusting their action as a result of the disturbance required in the restriction, so it appears that there is an effect on manipulation in the perception of these swimmers (organism restriction). In this sense, we could explain that the consistency found cannot be determined by biological factors, as there were no significant differences between the PHV, but could be in the order of motor experience, i.e., the formation of a motor scheme with greater consistency for the action.

The formation of the Motor Scheme finds support in the Generalized Motor Program Theory (Schimidt *et al*, 2001), although we are not sure what kind of activities these subjects had during their lives; either of a general nature (due to the culture of the body, what it's lived through during its motor development) or specific (swimming, amateur or competitive time). However, the results described in the Convergent Foramen (CF) could corroborate and support the hypothesis that this restriction would imply this new mental representation, although in the present study, the other restrictions did not have the same statistical relevance. Thus, further clarification is needed in future studies, for example, with larger samples, in high-skill swimmers, or even replicating the study under other conditions. When analyzed together, the relative timing of the submerged phase in relation to the absolute values shows that swimmers could decrease their stroke frequency (SF) and increase their stroke length (SL), as an increase in the percentage was observed during submerged phase. So, it seems that the swimmers should be changing their swimming strategy, as they should maintain the same speed at all moments of restrictions, and in the study all swimmers remained at the same speed (VC). It appears that the present study may contribute, in part, to perceptual manipulation in the visual field by maintaining constant surface characteristics when observing the effect on retinal manipulation; although we can observe in the literature that studies are being conducted on manipulating both visual feedback (Szczwpán *et al*, 2016) and verbal feedback (Zatón *et al*, 2014).

Conclusion

According to present results, one can conclude that the Converged Foramen can promote significant changes in both relative (relative timing) and absolute (submerged phase time) values, although it represents a small effect. It is noteworthy that for the studied sample the Convergent Form did not show any influence of biological maturation. Such findings can be applied in sports pedagogical practice to alter the mental representation of the individual over the technical gesture, thus improving the sports technique through intrinsic feedback. There is still a need for further clarification through future studies, to amend some limitations of the present study, such as sample enlargement, the application of this method in high skill swimmers and exploring other conditions for applying the method.

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