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Effects of hand dominance on regular physical activity levels in males and females

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Abstract

This study aims to investigate the effects of hand dominance on regular physical activity levels in males and females. Data were collected from 2700 participants including 1350 males and 1350 females aged 14-95 years were chosen randomly. Physical activity stages of change were compared among right handers (RH), left handers (LH) and both handers (BH) depending on their hand preferences. Results of this study showed that no significant difference was observed in physical characteristics among three groups in both genders. There were significant differences in the means of physical activity levels among RH, LH and BH in males not females. Male BH had a higher regular physical activity level ($2,97\pm1,54$) than those of LH ($2,70\pm1,46$) and RH ($2,70\pm1,53$). It can be concluded that regular physical activity level increases with bilaterally and handedness can be used as criteria in the regulation of behavior change strategies.

Keywords: Hand dominance, physical activity, gender.

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1. Introduction

The right hemisphere of the brain was generally associated with spontaneous and automatic responses, while the left hemisphere was mostly responsible for logical, controlled and deliberate actions (Spence & Flynn, 2001). Handedness has been studied as indirect indicator of cerebral lateralization (Bishop, Ross, Daniels, & Bright, 1996). Regular physical activity is planned activities in daily life. So, it is important to consider hand dominance as a criterion in the regulation of behaviour modification strategies for individuals in their tendency towards regular physical activity. Giotakos (2004) investigated the relationship between handedness and hobby preference on 879 healthy young men with the mean age of 22.3 years. He found that more cultured individuals were much less likely to be strongly right-handed. Interestingly, strong right-handers represented excessively in group mainly preferred doing sports, Strong left-handers preferred mostly reading books, collecting, or going to the cinema/theatre. On the other hand, both handers preferred arts, like playing music, drawing, or handicraft. This findings supported hypothesis that handedness was associated with hobby preference.

Although the relationship between handedness and regular physical activity levels is not fully understood in large population, right-handers have been found to prefer sports participation over left-handers (Giotakos, 2004). Similarly, Cardinal (2005) investigated the effects of hand dominance on regular physical activity stages of behaviour change on small sample size with 151 participants and he found that left handers showed significantly higher participation rates (84.6%) than right handers (48.1%) for three stages of behaviour change including inactivity and irregular activity. We hypothesized whether regular physical activity stages of behaviour change were differentiated by handedness in males and females from different age groups. Thus, this study aims to investigate the effects of hand dominance on regular physical activity levels in males and females.

2. Material and Method

Data were collected from six groups consisted of 14-19, 20-29, 30-39, 40-49, 50-59 and 60-95 years of age. Totally 2700 participants including 1350 male and 1350 females at the age range of 14-95 years living in Samsun central districts were chosen randomly.

Turkish version of Physical Activity Stages of Change Questionnaire (PASCQ) was used for data collection in different age groups for male and females (Cengiz, Asci & İnce, 2010). In this study, participants were divided into five categories as stages of exercise behaviour change including a pre-contemplation, contemplation, preparation, action, and maintenance stages. The physical activity score was determined by giving 1 point to pre-contemplation, 2 points to contemplation and 3 points to preparation, 4 points to action and 5 points to maintenance stages. Participants were divided into three groups as right handed (RH), left handed (LH) and both handed (BH) or ambidextrous depending on their hand preferences in daily usage. One way analysis of variance (ANOVA) tests were used for comparison of physical activity participation rates among groups depending on hand dominance. The origin of differences was determined by post Hoc LSD test (Least Significant Difference).

3. Results and Discussion

The distribution of hand preferences in males was that 916 participants (67.9.2%) were right-handed, and 148 participants (11.7%) were left-handed while 276 participants (20.4%) were both

handed. The handedness scores of females found 926 participants (68.6%) were right-handed and 166 participants (12.3%) were left-footed, 258 participants (19.1%) were both handed.

The results of this study demonstrated that body height and weight, and BMI were not significantly differentiated with respect to handedness in males and females (Table 1). Regular physical activity stages of behaviour change were differentiated among RH, LH and BH in males. BH had a higher physical activity level than left and right handers (Table 1). Differences in females were not significant among RH, LH and BH participants.

This study aims to investigate whether regular physical activity stages of behaviour change were differentiated among right handers, left handers and both handers in male and female from different age groups. In sport activities, it appear that the proportion of left-handed athletes at top performance level is high in baseball (McLean & Ciurczak, 1982), tennis (Holtzen, 2000), fencing (Bisiacchi, Ripoll, Stein, Simonet, & Azemar, 1985), cricket (Wood & Aggleton, 1989), boxing (Gursoy, 2009), wrestling (Ziyagil et al. 2010) due to their superior spatio-motor skills, (Geschwind & Galaburda, 1985). But it was claimed that higher proportions of left-handers in different sports are due to the nature of the games themselves, and not to neurological superiority related to handedness (Wood & Aggleton, 1989).

It was well known that there were limited numbers of studies related to advantages and disadvantages of right- and left-handedness in physical activity participation (Giotakos, 2004; Cardinal, 2005). In our study, there were significant differences in the means of physical activity levels (stages of exercise behaviour change) among RH, LH and BH in males. Groups selected by hand preferences had a similar means of age, body height and body weight, and body mass index. Regular physical activity levels had no effect on physical characteristics of participants among three groups as expected in both gender (Table 1). Differences in females were not significant among three groups. Male both handers had a higher regular physical activity level ($2,97\pm1,54$) than those of left handers ($2,70\pm1,46$) and right handers ($2,70\pm1,53$).

The results of this study are disagreement in the results of studies done by Giotakos (2004) and Cardinal (2005). Strong right handers Giotakos (2004) reported that strong right-handers represented excessively in group mainly participating sport activities while our study showed that both right and left handers had a lower physical activity levels than both handers. In other side, Cardinal (2005) reported that left handers were inactive or they participated irregularly the physical activity with compare to right handers. Contrary to these two studies, our study demonstrates that male both handers are superior to right handers and left handers in the participation in regular physical activity in males.

In males, the superiority of both handers supports the idea that daily life includes many deliberated and spontaneous activities. An individual may need the functions of both hemispheres of his or her brain for participating daily tasks, social activities and regular physical activity while confronting daily stresses. These daily efforts include planned and unplanned actions. As stated by Spence and Flynn (2001), the right hemisphere of the brain was generally associated with spontaneous and automatic responses, while the left hemisphere was mostly responsible for logical, controlled and deliberate actions. Clearly, the both-handed (bilateral) male participants had a significant advantage for participating regular physical activity in comparison to the right and left-handers (unilateral). It may be considered that bilaterally is related to higher tendency toward to physical activity and may contribute to better physical fitness in the regulation of behaviour change strategies. It can be concluded that

regular physical activity level increases with bilaterality and handedness can be used as criteria in the regulation of behaviour modifications strategies.

Further research is required to assess whether regular physical activity stages of behaviour change were differentiated by handedness in males and females from different age groups for promotion physical activity.

3. Tables

Table 1. Comparison of physical activity level among right handers, left handers and both handers in males and females.

Variables	Groups	M A L E S						F E M A L E S					
		N	M	S.D.	F	Sig.	LSD	N	M	S.D.	F	Sig.	LSD
Age (Years)	Righ Handers	916	39,78	17,41	1,584	,206	na.	926	40,36	17,95	,371	,690	na.
	Left Handers	158	42,23	18,89				166	39,16	17,14			
	Both Handers	276	39,21	18,10				258	39,74	18,71			
	Total	1350	39,95	17,74				1350	40,09	17,99			
Body Height (cm)	Righ Handers	916	171,19	10,34	,566	,568	na.	926	164,71	7,69	1,733	,177	na.
	Left Handers	158	171,25	10,18				166	163,64	7,74			
	Both Handers	276	171,95	10,68				258	164,01	9,17			
	Total	1350	171,35	10,39				1350	164,45	8,00			
Body Weight (kg)	Righ Handers	916	73,24	14,06	,930	,395	na.	926	66,69	12,51	,869	,420	na.
	Left Handers	158	73,39	14,15				166	66,10	12,79			
	Both Handers	276	71,97	13,78				258	65,55	13,20			
	Total	1350	73,00	14,01				1350	66,40	12,68			
Body Mass Index (BMI)	Righ Handers	916	24,97	4,36	2,664	,070	na.	926	24,62	4,63	,192	,825	na.
	Left Handers	158	25,03	4,51				166	24,73	4,82			
	Both Handers	276	24,30	4,09				258	24,45	5,14			
	Total	1350	24,84	4,33				1350	24,60	4,75			
Stages of Exercise Behavior (1-5 points)	Righ Handers	916	2,70	1,53	3,455	,032*	BH> RH, LH.	926	2,87	1,56	2,035	,131	na.
	Left Handers	158	2,70	1,46				166	2,86	1,64			
	Both Handers	276	2,97	1,54				258	3,09	1,58			
	Total	1350	2,76	1,53				1350	2,91	1,58			

*P<0.05, na.=not available.

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