Original Article

Predictors of quality of life in children

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ABSTRACT

Borras PA, Vidal J, Ponseti X, Cantallops J, Palou P. Predictors of quality of life in children. *J. Hum. Sport Exerc.* Vol. 6, No. 4, pp. 649-656, 2011. The aim of this study was to explore the relationship between Health related quality of life (HRQoL) in children reported by parents, cardiorespiratory fitness, physical activity levels, screen time and body mass index of a population of 302 eleven and twelve years old children. The objective was to investigate the relation of cardiorespiratory fitness with some domains of quality of life to determine if fitness is a key factor rather than physical activity, to ensure future quality of life in children, Child health and Illness Profile-Child Edition/Parent Repot Form (CHIP-CE/PRF) was used to measure HRQoL, 20m shuttle run test, for fitness. SHAPES, Physical activity module was used to measure weekly physical activity and screen time. Height and weight was reported by parents. Results show a strong correlation with Fitness and HRQoL, and screen time with HRQoL, but not with Physical activity. The findings of this study suggest that Fitness in children is a more important predictor, than PA in disease prevention. **Key words**: CARDIORESPIRATORY FITNESS, SCREEN TIME, PHYSICAL ACTIVITY, BMI.

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INTRODUCTION

The evidence of the benefits of physical activity and cardiovascular fitness on the physical health and quality of life is well documented. These benefits include a reduced risk of coronary heart disease, hypertension, and type II diabetes (Ortega et al., 2008). Health related quality of life (HRQoL) is a resource for adaptation and healthy growth. When HRQoL diminishes, a child is less likely to be able to develop normally and mature into a healthy adult (Riley et al., 2006). The frequency, duration and intensity of physical activity necessary to confer these various benefits in children remain the subject of debate, although the general consensus is for children and youth to accumulate an average of at least 60 minutes per day and up to several hours of at least moderate intensity, and aerobic activities should make up the majority of the physical activity (Jansen & Leblanc, 2010). The majority of the evidences for the psychological benefits on physical activity in children is based upon single physical activity sessions or cross sectional (self-report) studies, there is a recognized need to consider the effect of habitual physical activity on children's quality of life (Parfit & Eston, 2005). Previous studies have shown that lifestyles are associated with mental and health status, as well as HRQoL in adults, but there is no consensus about the effect of Physical activity on the different determinants of HRQoL in children (Chen et al., 2005).

The negative effects of sedentary lifestyles on children's health is also a source of concern, the increasing prevalence of obesity among developed countries coincides with an increasing prevalence of high screen time (defined as a combination of activities such a watching television or playing video games (Anderson et al., 2008; Letherdale et al., 2008). The American academy of pediatrics recommends that children's screen time be limited to no more than 1 to 2 hours per day.

Social cognitive theory posits that sedentary behavior is influenced by personal beliefs, physical characteristics, and other related behaviors (frequency or regular participation in physical activity). Empirical research has demonstrated support for these relationships with respect to screen time (Leatherdale & Wong, 2008). TV viewing also predicts lower fitness, but not higher Body Mass Index (Mota et al., 2010), this is an important finding because cardiorespiratory fitness (CRF) is one of the most important targets in preventing childhood obesity. There is also evidence that a strong relationship between PA levels and metabolic risk exists in children with low CRF (Ortega et al., 2008).

Physical fitness is nowadays considered one of the most important health markers, as well as a predictor of morbidity and mortality for cardiovascular disease (Aires et al., 2010). Childhood and adolescence are crucial periods of life and improvement in cardiorespiratory fitness seem to positively affect depression status, and self-esteem, this improvement is required for an enhanced psychological well-being. In this regard the literature about young people is rather scarce (Ortega et al., 2008).

The links between obesity and HRQoL have been less studied, and limited research exists linking youth obesity to poorer youth HRQoL, it appears likely that increasing weight status has a moderate to strong negative influence on HRQoL in pediatric populations, whereby decrements of in HRQoL are evident as soon as BMI is above the healthy normal limits (Tsiros et al., 2009), youth overweight showed significant positive association to adult HRQoL, however no associations have been found between youth PA and adult mental or physical HRQoL (Herman & Hopman, 2010).

We analyzed the relationship between BMI, Physical activity, screen time, Cardiorespiratory fitness and Health related quality of life in children of 11-12 years old in Majorca Island, Spain during the school year 2008-2009. The aim of this study was to examine the correlations between different factors of quality of life, with anthropometric measures, levels of physical activity, cardiorespiratory fitness and sedentary behaviors in children.

MATERIAL AND METHODS

Participants and data collection

This was a cross sectional study that was carried out as a part of the SAFE project, a school based global intervention to promote healthy habits in school age children in the Balearic Islands, west coast of Spain. This study collects information on a group of 11-12 children about their levels of Physical activity, Physical inactivity (screen time) and Physical fitness, as well as collects the information of the Health related Quality of Life reported by their parents.

A group of the 11-12 years old (grades 5-6), participants from regional elementary schools were selected (n=302; 151 boys and 151 girls). The data described in this study was collected between March and April 2009. The children and their families received written information about purposes and the content of the study. Before the study began all parents, teachers and managers of schools approved the study protocol, and all parents signed an informed consent. The ethics committee from the University of the Balearic Islands approved this study.

Table 1, shows both average BMI in a percentile 75 compared to CDC grow charts, and average level of physical activity and also a cardiorespiratory fitness average for this European population (Ruiz et al., 2011).

Table 1. *Descriptive data for boys and girls.*

Variable	Boys (n=151)		Girls (n=151)	
	Mean	(SD)	Mean	(SD)
Age (y)	11.6	(1.01)	10.7	(3.1)
BMI (kg/m^{-2})	19.40	(3.1)	18.50	(2.9)
Physical Activity (Hr./Week)	10.94	(6.05)	8.56	(5.6)
Cardiorespiratory Fitness (beeps)	4.39	(2.1)	3.37	(1.57)

Assessment of health related quality of life

The Spanish version of the Child Health and Illness Profile-Child Edition /Parent Report Form (CHIP-CE/PRF) (Estrada et al., 2010) was used to evaluate Health related Quality of Life. This instrument (Riley et al., 2004) collects parent reported health information about children aged 6-12 years. The CHIP is based on a broadly defined conceptual framework which recognizes that health includes not only perceptions of well-being, illness and health, but also participation developmentally appropriated tasks and activities, originally this instrument include 5 domains, in this study we have used four domains to shorten the time of the questionnaire (this version has been also validated); Satisfaction with health, Physical comfort, Emotional comfort and restricted activity.

Assessment of physical activity and screen time

The School Health Action, Planning and Evaluation System (SHAPES) physical activity questionnaire (Wong et al., 2006), consists of 45 multiple choice questions, items request 7 day recall of moderate to vigorous PA, but not only to measure self-reported physical activity levels but inform about participation in physical activities, sedentary activities (Watching TV, playing videogames, homework), social influences (e.g., parent and peer influences), and school environment for children 11-16 years old.

Assessment of cardiorespiratory fitness

20m shuttle run test (20mSRT) from the ALPHA Health related fitness test battery for children and adolescents, (Ruiz et al., 2011) recently validated and can be considered both valid and reliable to assess cardiorespiratory fitness and seems to be the best one in estimate Vo2max in children and adolescents.

Statistical analysis

Descriptive statistics (means and standard deviations) were calculated for all anthropometric characteristics physical fitness, physical activity and sedentary behaviors (screen time) according to gender group. Our analysis focused specifically on the association between HRQoL domains and Physical activity levels, BMI, Screen time, CRF (Pearson correlation). On a secondary analysis we focused in association between HRQoL domains and peer and parents physical activity influence, Pearson correlation was used. The level of significance was set at $p<0.05$* and $p<0.01$**. Data were analyzed using SPSS (Mac version 19.0).

RESULTS

Table 2 shows Pearson correlation between Health related quality of life domains (satisfaction physical comfort, emotional comfort and restricted activity) with levels of physical activity, screen time, cardiorespiratory fitness and BMI.

As a secondary analysis the influence of the active parents and active friends was an interesting field of evaluation, Table 3 shows the relationship between the quality of life domains and peer and parents influence.

As a consequence of the previous analysis cardiorespiratory fitness has emerged as a fundamental key issue in quality of life, Table 4 shows Pearson correlations for CRF with Age, PA, Screen Time (ST), BMI, and Active Friends.

Table 2. *Health related Quality of Life domains relationship with Physical Activity, Sedentary Behaviors, Cardiorespiratory Fitness and Anthropometric measures.*

		Satisfaction with health	Physical comfort	Emotional comfort	Restricted activity
Physical activity	*Pearson*	0.061	0.021	-0.019	-0.059
	Sig.	0.291	0.717	0.740	0.312
	N	301	301	299	298
Screen time	*Pearson*	-0.085	0.148*	0.109	0.191**
	Sig.	0.143	0.010	0.061	0.001
	N	301	301	299	298
CRFitness	*Pearson*	0.053	-0.127*	-0.077	-0.010
	Sig.	0.367	0.029	0.190	0.861
	N	293	293	291	290
BMI	*Pearson*	0.047	0.016	0.029	-0.127*
	Sig.	0.415	0.785	0.623	0.028
	N	301	301	299	298

BMI= Body Mass Index. CRFitness= Cardiorespiratory Fitness. p<0.05; p<0.01**.*

DISCUSSION

This study aimed to examine the relationship between quality of life domains reported by parents through CHIP-CE/PRF with levels of physical activity, screen time, BMI, and cardiorespiratory fitness.

The analyzed group shows a BMI mean of 19.4 in boys and 18.5 in girls, according to CDC grow charts, both boys and girls are at percentile 75, and according to Spanish consensus in measuring weight and height (AEP, SENC, SEEDO), boys and girls are at percentile 70.

Physical activity pattern shown by our group is a little below the average for 11 years old children in European population according to physical activity levels and patterns of 9-15 years old children in Europe (Riddoch et al., 2004).

Table 3. *Pearson correlation for HRQoL domains and active peer and active parents influence.*

		Satisfaction with health	Physical comfort	Emotional comfort	Restricted activity
Active father	*Pearson*	-0.165**	0.098	0.090	0.102
	Sig.	0.004	0.090	0.121	0.080
	N	300	300	298	297
Active mother	*Pearson*	-0.074	0.107	0.090	0.077
	Sig.	0.200	0.064	0.120	0.187
	N	301	301	299	298
Active friends	*Pearson*	0.150**	-0.051	0.001	0.133*
	Sig.	0.009	0.375	0.985	0.022
	N	301	301	299	298

p<0.05; p<0.01**.*

Cardiorespiratory fitness in this group is in the percentile 50 for boys and percentile 55 for girls, according to ALPHA norm values for physical fitness in European population (Ruiz et al., 2011).

Considering our focus group a standard population, we would like to analyze the relationship between cardiorespiratory fitness with health related quality of life reported by parents.

The most important outcome of this study was the result showed that **cardiorespiratory fitness predicts quality of life** (Physical comfort), so did it screen time (restricted activity), confirming the findings that screen time is associated with sedentary behavior (Leatherdale et al., 2010).

BMI is associated with poor quality of life (restricted activity), on the contrary, **physical activity is not a predictor for quality of life in children**. There is limited research linking HRQoL to physical activity in children and Scarce literature linking Physical fitness to HRQoL, our research confirm the findings about the BMI and physical activity associated with better or worse quality of life (Swallen et al., 2005), who reported positive associations between BMI and HRQoL, and no associations were found between Physical activity and HRQoL (Herman & Hopman, 2010).

Table 4. *Cardiorespiratory Fitness correlation with analyzed variables.*

		Age	Physical Activity	BMI	Screen Time	Active Friends
CR-Fitness	*Pearson*	0.207**	0.175**	-0.241**	-0.130*	0.127*
	Sig.	0.000	0.003	0.000	0.026	0.029
	N	294	294	294	294	294

p<0.05; p<0.01**.*

Our findings confirm the hypothesis that Fitness has a positive association with HRQoL but no positive associations to Physical activity. The key point, is the intensity of physical activity reported in the questionnaires, Physical activity need a vigorous intensity to causes changes in fitness, and is in this moment that affects the whole body not only affecting the energy balance but providing the subject significant adaptations to their body.

On a deeper analysis on fitness, our findings suggest that better cardiorespiratory fitness is associated with less screen time, confirming other studies that reported an inverse positive association between screen time and cardiorespiratory fitness (Mota et al., 2007; Mota et al., 2010).

And last but not least, cardiorespiratory fitness is positively associated with physical activity and is also positively associated with active friends, confirming results from studies relating environmental and peer influences in physical activity and fitness (Leatherdale et al., 2008).

Analyzing the parent and peer influences, our findings show some associations with active friends and HRQoL (satisfaction with health and restricted activity), the idea that quality of life includes not only perceptions of well-being, illness and health, but also participation developmentally appropriated tasks and activities, and the relations with relatives and friends.

The findings of this study are important due to many lifestyle habits are established during childhood, physical activity and exercise habits may also be established during this years, but with an orientation to improve Physical fitness, otherwise it will be a good activity to increase energy expenditure (Jakson et al., 2009) but will not achieve the main objective, improving children's health.

Strengths of this study are its original approach to the Health related quality of life from the Physical fitness perspective, which allowed us to confirm the hypothesis that fitness is a powerful and relevant marker of health. These findings are important because they provide a field of future research in the relationship between physical fitness and HRQoL.

Limitations should be recognized. First the small sample size, and therefore results should be interpreted with caution due to underpowered data. Self-report physical activity is also a limitation, but results indicate similar PA levels to other studies with objective measures. In third place, cardiorespiratory fitness were assessed indirectly although, 20m shuttle run test, is included in the majority of fitness batteries around the world, and is considered a valuable tool for studying CRF in young healthy children.

CONCLUSION

In conclusion, this study examined the association between HRQoL and CRF, PA, Screen time and BMI, and the results suggest that Cardiorespiratory Fitness and Screen time have significant association with some quality of life domains but not Physical activity.

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