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## A two-week summer program promoting physical activity: quality of life assessment in Italian children

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### ABSTRACT

Physical activity (PA) can be associated with better health-related quality of life (HRQoL). This study aimed to assess HRQoL before and after a two-week summer program promoting PA in Italian school-aged children. Participants were recruited during the *Giocampus summer2017* (Parma, Italy), from June to July. Before (T0) and after (T1) the program, children and one of their parents answered the Kindl questionnaire. For each domain, least-square mean changes (LSmc) at T1 were derived from linear regression models stratified by responder and adjusted for child gender, age group, time spent in PAs and HRQoL score of the responder at T0. 350 children (7-13 years, 52% males) and 342 parents answered the questionnaire at both T0 and T1. At T1, the HRQoL score of the children significantly improved in the *emotional* (LSmc 2.9,  $p < 0.001$ ), *self-esteem* (LSmc 3.3,  $p < 0.001$ ), *family* (LSmc 4.2,  $p < 0.001$ ) and *friend* (LSmc 3.1,  $p < 0.001$ ) domains. Parents reported significantly more improvement in *self-esteem* than children (LSmc 6.7 vs 3.3,  $p = 0.012$ ). Children spending more time in PA reported significantly more improvement in *self-esteem* than those doing less PA (LSmc 4.4 [ $p < 0.001$ ] vs 2.2 [ $p = 0.181$ ]). A short summer program promoting PA may improve HRQoL in the general population of school-aged children.

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Children; health-related quality of life (HRQoL); physical activity; short summer program

## Introduction

A growing body of literature evidence suggests that physical activity (PA), including recreational PA and unstructured play, is associated with better self-esteem (Ekeland et al., 2004) and reduced depression, anxiety and psychological distress (Ahn & Fedewa, 2011). PA enhances self-efficacy and motivation, and increases the secretion of serotonin and endorphins (DeBoer et al., 2012; Quaresma et al., 2014). In children, PA offers the opportunity to develop social skills through interaction with peers (Hinkley et al., 2008); moreover, physically active children have fewer emotional problems and hyperactivity-inattention issues (Griffiths et al., 2010). Such evidence endorses the hypothesis that PA can have a beneficial effect on health-related quality of life (HRQoL), a multi-dimensional

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concept that includes domains related to physical, mental, emotional and social functioning.

The assessment of HRQoL in children and adolescents, and its relationship with PA, has mainly been investigated in cross-sectional studies, and only a few ones evaluated the effect of PA intervention programs on HRQoL (Wu et al., 2017). School-based programs lasting 3 to 24 months, showed inconsistent, indirect or slightly beneficial effects (Dobbins et al., 2013; Kriemler et al., 2011; Quaresma et al., 2014). A four-week summer program in Shanghai (China) showed beneficial effects in reducing body fat but did not include HRQoL as an outcome (Tang et al., 2014), while another intervention in Baltimore (USA) yielded improvements in PA, but not in perceived stress (Pierce et al., 2017).

HRQoL is increasingly used as an outcome in children to assess their subjective perspective of physical, psychological and social health (WHOQoL group, 1995). In the general population, the use of generic questionnaires is recommended for assessing HRQoL (Baiardini et al., 2010; Lin et al., 2013). Children can be independently surveyed through age-specific instruments approximately from the age of seven, carefully considering that their cognitive and linguistic skills are still developing (Bell, 2007). However, many HRQoL instruments use both child self-reports and parent-proxy reports. In general, research has shown that there is little agreement between these two assessments, with different influencing factors (e.g. child age, parents' own HRQoL, or HRQoL subscale) (Cremeens et al., 2006; Eiser & Varni, 2013; Upton et al., 2008). Parental reports cannot adequately replace children's self-reports of quality of life (QoL) (Ellert et al., 2011); besides, there might be inconsistency in measurements provided by fathers, mothers or other relatives (Lee et al., 2016). On the other side, the parent-proxy report can provide additional useful information (e.g. confirming some findings), even becoming the primary outcome if the child is unable to make a self-assessment (e.g. if the child has an intellectual disability) (Jalali-Farahani et al., 2016; Lee et al., 2016).

To date, no previous works have reported on HRQoL in children from the general population participating in a very short (<1 month) program based on the promotion of PA. In this regard, the *Giocampus*<sup>®</sup> project ([www.giocampus.it](http://www.giocampus.it)) (Vanelli & Finistrella, 2011) consists of a multi-sectoral, multi-partner initiative set in Parma (Italy) that involves local government, university, sport clubs, and food industry. The project aims to develop motor skills and nutritional knowledge through play (the prefix 'gio' stands for 'gioco' which means 'play' in Italian) in schoolchildren aged 5 to 14 years and to encourage them to take up healthy behaviours, such as being more physically active together with their peers. Growing concern over the prevalence of unhealthy behaviours, as revealed in previous surveys about the lifestyle of children living in the area (Fainardi et al., 2009; Vanelli et al., 2005), gave rise to the project. *Giocampus summer*<sup>®</sup> offer 2-week courses promoting physical exercise under the supervision of professional trainers during summertime. The program is defined and monitored by a steering committee made up of scientists, paediatricians, teachers, educational specialists, psychologists, public administrators, and food factory managers. *Giocampus*<sup>®</sup> teachers are supported by the Graduate School of Sport and Exercise Sciences and by the Graduate School of Nutritional Sciences of the University of Parma.

The current study aimed to assess HRQoL before and after the two-week *Giocampus Summer*<sup>®</sup> program, in a sample of school-aged children from the general population. The assessment was based on both child's and parent's perspectives.

## Materials and methods

### Study design and participants

A pre/post assessment design was used. A convenience sample of school-aged children was recruited during the *Giocampus summer*<sup>®</sup> 2017 (Parma, Italy), from June 12<sup>th</sup> to July 10<sup>th</sup>. All children between 7 and 13 years were eligible; a medical certificate of fitness for non-competitive sports issued by the general practitioner was required. The certificate was based on the new operating standards imposed by the Italian Ministerial Decree of August 8<sup>th</sup>, 2014, and subsequent recommendations contained in the Explanatory Note of the Italian Ministry bearing the date of June 15<sup>th</sup>, 2015 ([www.trovanorme.salute.gov.it/norme/renderNormsanPdf?anno=0&codLeg=49865&parte=1%20&serie=](http://www.trovanorme.salute.gov.it/norme/renderNormsanPdf?anno=0&codLeg=49865&parte=1%20&serie=)). Informed consent was obtained after discussing objectives and methods with children and their parents. Children were then enrolled upon registration to the camp and consecutively assigned to different activity programs (see below) in groups of 15. Ethical approval was granted by the Institutional Review Board of the University of Parma (Prot. n. 0047/2017).

### Activity programs

Under the supervision of professional trainers, each child underwent a two-week activity program, Monday to Friday from 09.15 to 17.30. All children carried out PA and recreational activities (RA) for a total number of 59 hours. Consistently with the World Health Organization definition ([www.who.int](http://www.who.int)), the activities involving any body movement produced by skeletal muscles that require energy expenditure were referred to as PA (e.g. athletics, baseball, basketball, football, field hockey, volleyball, rugby, dance, tennis, mountain biking, swimming pool activities). All other games and lab activities were referred to as RA (e.g. water park, taste lab, music lab, kitchen lab, artistic lab, nature park).

To take into account the developmental needs and abilities of the different age groups, and to provide a good variety of activities with the different instructors, 20 different age-specific activity schedules were designed. There were 10 schedules for children aged 7 to 10 years, including 20 to 30 hours of PA (and consequently 39 to 29 hours of RA, for a fixed total number of 59 hours), and 10 schedules for children aged 11 to 13 years, including 23 to 33 hours of PA (and consequently 36 to 26 hours of RA, for a fixed total number of 59 hours). For each child, the time spent in PA was categorized into 'less PA' if the number of hours spent in PA was lower than the age-specific median (25.5 hours in the age group 7–10 years, 28 hours in the age group 11–13 years), 'more PA' otherwise. [Table 1](#) summarizes the number of hours spent in PA and in RA by age, after the categorization. Of note, participants were all actively engaged in the summer camp, carrying out at least 20 hours of PA.

Morning (10.15–10.30) and afternoon (16.00–16.30) snacks and lunch (12.30–14.00) were provided, based on the Mediterranean diet (carbohydrates 45–60% and fats 20–35% of total calorie intake; proteins 0.81 g/kg/day for children aged 7 to 10 years, 0.79 and 0.77 g/kg/day for boys and girls respectively aged 11 to 13 years). An example of a weekly activity schedule is reported in [Table 2](#).

**Table 1.** Number of hours spent in physical activities (PA) and in recreational activities (RA) by age, after categorization of children into 'less PA' and 'more PA'.

Age group	less PA			more PA		
	PA	RA	Total	PA	RA	Total
7-10 years	min	max	59	min	max	59
	20	39		25.5	33.5	
	max	min		max	min	
11-13 years	24.5	34.5	59	30	29	59
	min	max	59	min	max	59
	23	36		28	31	
	max	min		max	min	
	27.5	31.5		33	26	
		59				

**Table 2.** Example of *Giocampus summer*<sup>®</sup> weekly schedule (PA highlighted in bold).

	Monday	Tuesday	Wednesday	Thursday	Friday
09.15–10.15	Artistic lab	<b>Mountain biking</b>	Artistic lab	<b>Mountain biking</b>	Artistic lab
10.15–10.30			Morning snack		
10.30–11.30	Water park	Nature park	Water park	Nature park	Water park
11.30–12.30	<b>Basket</b>	<b>Swimming pool</b>	<b>Baseball</b>	<b>Swimming pool</b>	<b>Basket</b>
12.30–14.00			Lunch		
14.00–15.00			Taste Lab (nutritional education)		
15.00–16.00	<b>Football</b>	<b>Volleyball</b>	<b>Rugby</b>	<b>Basketball</b>	<b>Football</b>
16.00–16.30			Afternoon snack		
16.30–17.30	Music Lab	Kitchen Lab	Music Lab	Kitchen Lab	Music Lab

### HRQoL assessment

The Italian versions of the KidKindl<sup>®</sup> (7–13 years) and the Kid\_KiddoKindl<sup>®</sup> (7–17 years) questionnaires ([www.kindl.org](http://www.kindl.org)) were used for the HRQoL assessments (Ravens-Sieberer & Bullinger, 1998). The KidKindl<sup>®</sup> questionnaire is a self-report instrument to investigate the child's perception of his/her HRQoL in the past seven days, while the Kid\_KiddoKindl<sup>®</sup> is the proxy version to investigate the parental perception of the children's HRQoL. Reference values were derived in a previous German study on children from the general population (Ravens-Sieberer et al., 2007).

Kindl<sup>®</sup> was chosen over other HRQoL instruments since it allowed to use one single version for the whole age range (7–13 years), for both the child and the proxy version. It is a generic QoL instrument including 24 Likert-scaled items associated with six domains: *physical well-being*, *emotional well-being*, *self-esteem* and relationship with *family*, *friends*, and *school*. Since the questionnaire was administered during summer, children did not answer the section dedicated to school. According to the Kindl<sup>®</sup> manual ([www.kindl.org](http://www.kindl.org)), all answers were scored on a scale from 0 to 100 points; missing values were replaced by individual-specific mean estimates, provided that the respondent had answered at least 70% of the items on the subscale. The questionnaire was administered in written form the first (T0) and the last day (T1) of the program before starting the activities. At T0, the proxy version of the questionnaire was completed by one of the parents; the same parent (mother or father) was asked to answer the questionnaire again at T1. Both at T0 and T1, children and parents answered the questionnaires independently, with the possibility to ask the instructors for assistance.

## Statistical analysis

All the statistical analyses were based on participants who completed the scheduled program (<20% days of absence) and performed through R version 3.4.2. Means and standard deviations (SD) at T0 and T1 were calculated for each HRQoL domain score of the KidKindl® (child) and Kid\_KiddoKindl® (parent) questionnaires. The high predominance of mothers did not allow stratification by parent gender. The differences in the mean ratings between parents and children were evaluated through paired t-tests, both at T0 and T1. The mean score changes between T1 and T0 were expressed as least square mean changes (LSmc, R package *emmeans*), i.e. means derived from linear regression models stratified by responder (child or parent) and adjusted for child gender, age group, time spent in PA and score of the responder at T0. For each HRQoL domain, child and parent score changes were regressed in the same model and stratification was achieved through two-way interaction effects between the responder and other variables. The least-square means represent the predicted means of the outcomes (the score changes) in a hypothetical population with a balanced (uniform) distribution of the variables included in the models, with quantitative variables (the score at T0) fixed at their mean. P-values lower than 0.05 were considered to indicate a statistically significant effect.

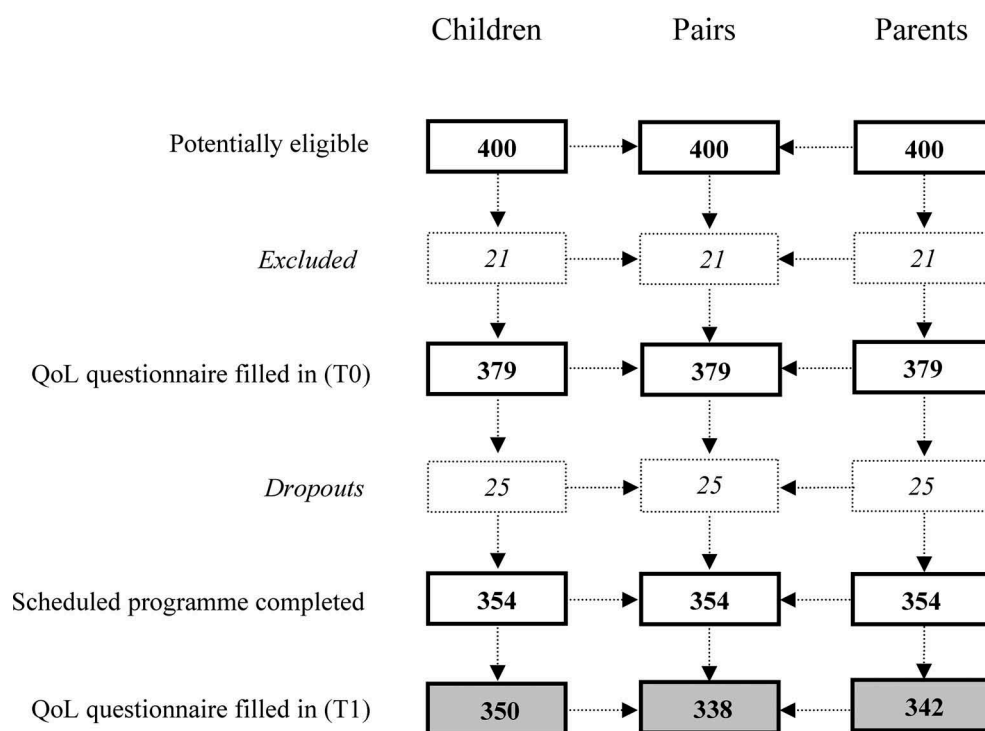
## Results

### Descriptive statistics

Figure 1 depicts the study flow chart. Out of 400 potentially eligible pairs of children and parents, 379 agreed to participate in the study and answered the questionnaire at T0. Twenty-five children (6.6%) did not complete the scheduled program. Compared to those completing the program, the baseline HRQoL scores of the 25 children who dropped out were not significantly different (data not shown); moreover, they were mostly younger children (7–10 years) and clustered into few activity schedules taking place in mid-July.

Out of 354 children completing the program, 350 (98.9%) answered the questionnaire at T1. Moreover, 342/354 (96.6%) parents answered the questionnaire at T1, resulting in 338/354 (95.5%) pairs of questionnaires answered at T1. Out of the 354 children completing the program, 184 (52.0%) were males; 238 children (67.2%) were in the age group 7–10 years and 116 (33.8%) in the age group 11–13 years. The median number of hours spent in PA was 25.5 (IQR 22–28) in the age group 7–10 years, 28 (IQR 26–31) in the age group 11–13 years. Overall, 135 children (38.1%) did less PA, 219 (61.9%) did more PA. The questionnaire for the parents was answered by the mother in 289 cases (81.6%), while the father answered in 65 cases (18.4%).

Table 3 reports the summary statistics of the KidKindl® (child) and Kid\_KiddoKindl® (parent) scores at T0 and T1 by HRQoL domain. At both T0 and T1, parent scores were significantly higher than the child scores for all domains, except for *emotional well-being*. Overall, both child and parent scores increased after the program. Ceiling effects (the percentages of children and parents reaching the highest score of 100) were generally below 15% at T0 and below 25% at T1. For each HRQoL domain and each responder, the percentage of reliable scores (at least 70% of the items answered) was higher than or equal to 95%.



**Figure 1.** Study flow chart.

**Table 3.** Summary statistics of the KidKindl® (child) and Kid\_KiddoKindl® (parent) scores at T0 and T1 by HRQoL domain.

T0	Child (n = 354) <sup>§</sup>	Parent (n = 354) <sup>§</sup>	$\Delta_{\text{parent-child}}$ (n = 354) <sup>§</sup>	p-value <sup>§§</sup>
Total score	78.2 (11.5)	82.5 (8.8)	4.4 (12.5)	<b>&lt;0.001</b>
Physical well-being	81.8 (15.7)	85.3 (11.7)	3.6 (17.0)	<b>&lt;0.001</b>
Emotional well-being	85.1 (14.1)	85.6 (11.7)	0.7 (16.7)	0.441
Self-esteem	66.7 (21.6)	75.3 (14.9)	8.8 (23.5)	<b>&lt;0.001</b>
Family relationships	77.2 (17.2)	81.2 (12.9)	3.9 (19.4)	<b>&lt;0.001</b>
Friend relationships	80.0 (17.5)	85.0 (11.4)	4.9 (18.5)	<b>&lt;0.001</b>
T1	Child (n = 350) <sup>§</sup>	Parent (n = 342) <sup>§</sup>	$\Delta_{\text{parent-child}}$ (n = 338) <sup>§</sup>	p-value <sup>§§</sup>
Total score	82.0 (11.3)	85.2 (8.9)	3.07 (10.8)	<b>&lt;0.001</b>
Physical well-being	82.4 (15.0)	84.1 (12.8)	1.81 (15.9)	<b>0.040</b>
Emotional well-being	88.6 (12.9)	89.6 (10.4)	0.94 (12.8)	0.182
Self-esteem	72.8 (21.7)	80.0 (14.3)	7.02 (22.3)	<b>&lt;0.001</b>
Family relationships	81.6 (16.2)	84.8 (13.0)	2.97 (16.7)	<b>0.001</b>
Friend relationships	84.7 (14.5)	87.5 (11.4)	2.77 (15.8)	<b>0.001</b>

Data are presented as mean (SD). <sup>§</sup>The score for each domain was calculated if the responder had answered at least 70% of the items. <sup>§§</sup>The p-value is from paired t-test. Significant p-values are highlighted in bold.

### HRQoL improvements after the Giocampus® summer

In all the estimated regression models (data not shown), the HRQoL scores at T0 were the strongest predictors for the score changes after the camp: the lower the baseline HRQoL scores, the higher the benefits. Through the least square mean approach, the score

changes were adjusted for the score of the respondent at T0, as well as for child gender, age group and time spent in PA. At T1, the LSmc in the total score was 2.7 ( $p < 0.001$ ) for the KidKindl® (children) and 3.4 ( $p < 0.001$ ) for the Kid\_KiddoKindl® (parents), but the LSmc difference (parent vs child) was not statistically significant (Figure 2).

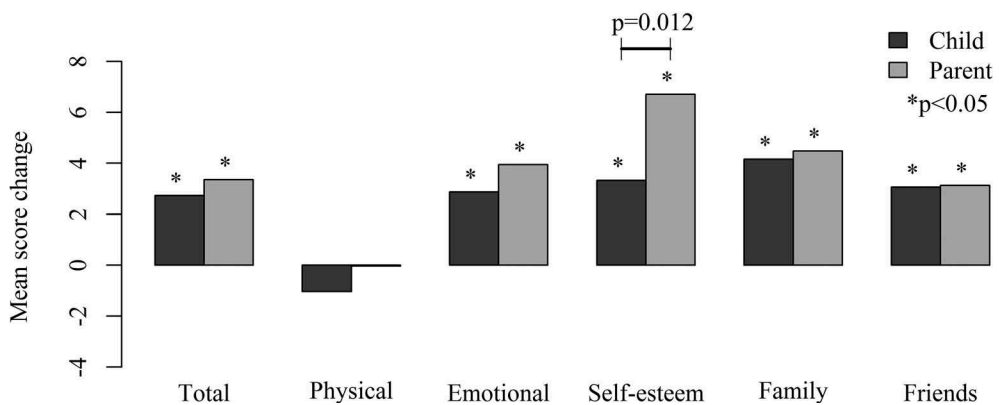
Concerning the specific HRQoL domains, at T1 a significant child score increase was observed in the *emotional* (LSmc 2.9,  $p < 0.001$ ), *self-esteem* (LSmc 3.3,  $p < 0.001$ ), *family* (LSmc 4.2,  $p < 0.001$ ) and *friend* (LSmc 3.1,  $p < 0.001$ ) domains. Parents reported significantly more improvement in the child's *self-esteem* than children themselves (LSmc 6.7 vs 3.3,  $p = 0.012$ ).

Figure 3 represents the LSmc for the different HRQoL domains by responder (child and parent) and time spent in PA. Overall, the children's HRQoL significantly improved at T1 regardless of the time spent in PA (for both responders). In children spending more time in PA, tendentially more worsening was observed in the *physical well-being* (LSmc  $-1.8$  [ $p = 0.049$ ] vs  $-0.3$  [ $p = 0.805$ ]), while tendentially more improvement was observed in the *self-esteem* domain (LSmc 4.4 [ $p < 0.001$ ] vs 2.2 [ $p = 0.181$ ]). In general, spending less time in PA was associated with tendentially more improvements in social relationships (*family* and *friend* domains, except for the parent *friend* domain), while doing more PA was associated with tendentially more improvements in *emotional well-being* and *self-esteem*.

## Discussion

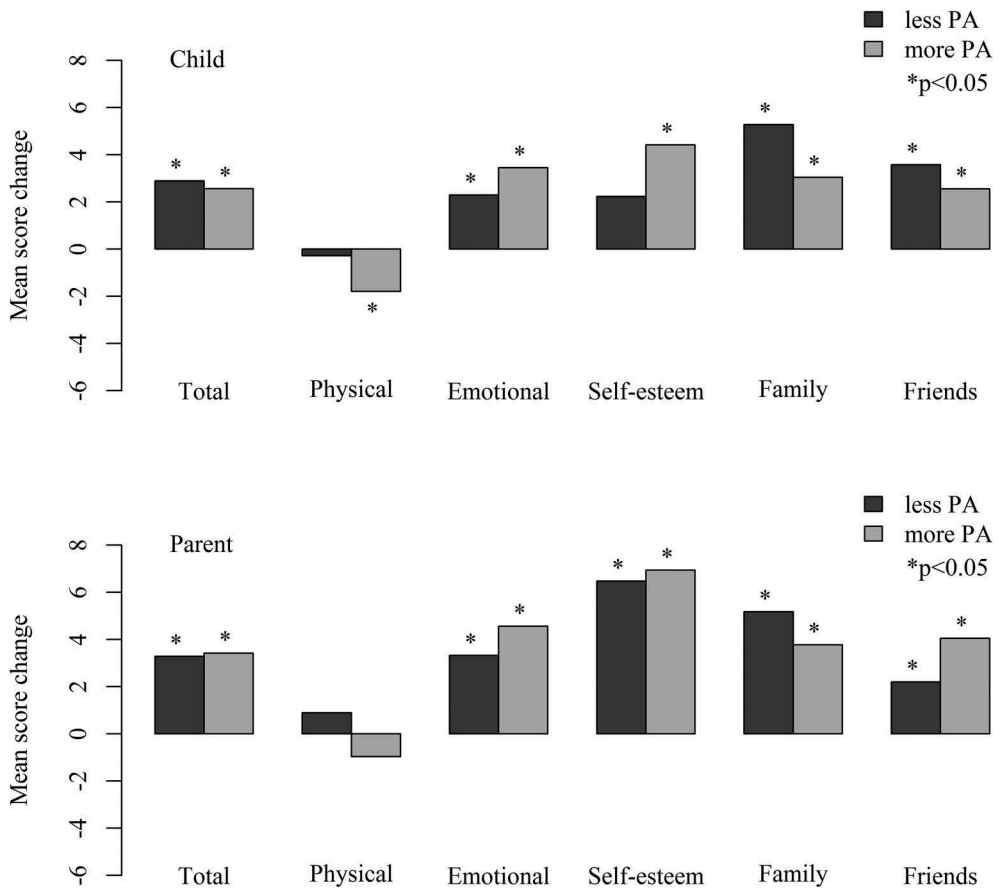
After two weeks, children involved in *Giocampus summer*® PA programs reported significant improvements in their HRQoL, including emotional well-being and self-esteem, and in their relationships with family and friends. Their parents reported the same improvements.

Before starting the summer program, the mean scores of the KidKindl® domains were higher than 80/100 for the *physical* and *emotional* well-being, approximately 70/100 for the *self-esteem* and slightly lower than 80/100 for the social relationships (Table 3). Even if the



**Figure 2.** Least-square mean changes in the different HRQoL domain scores by responder, adjusted for child gender, age group, time spent in physical activities and score of the responder at T0. Significant p-values ( $< 0.05$ ) are asterisked for the mean changes, while they are reported in full for the mean change differences.





**Figure 3.** Least-square mean changes of the different HRQoL domain scores by responder and time spent in physical activities (PA). Values are adjusted for child gender, age group and score of the responder at T0. Significant p-values (<0.05) are asterisked.

comparison requires caution, such values would be consistent with German norm values for the age group 7–10 years (Ravens-Sieberer et al., 2007), which is predominant in the present study (67.2%). All the mean scores were higher after the program, except for the *physical well-being* domain.

The mean changes in the HRQoL scores after the summer camp were expressed as least square mean changes, i.e. they were adjusted for several potential confounders. In particular, the effects were adjusted by the individual HRQoL scores at T0. Indeed, the baseline HRQoL score was the strongest predictor in the estimated models: the lower the HRQoL scores at T0, the higher the benefits. This was not surprising since the highest scores at T0 could not improve beyond the maximum value (100).

Overall, parents reported more improvements in the children's self-esteem after the summer program. In general, it is known that parents tend to overrate the child's HRQoL, especially for the *self-esteem* domain (Ellert et al., 2011; Theunissen et al., 1998). A parent may better describe this particular sphere because she/he can observe the child from an external point of view and may have a broader perspective being able to compare her/his child's self-esteem to other peers. Although only a few studies on the

effect of PA on HRQoL included parents' perspectives (Jalali-Farahani et al., 2016; Vella et al., 2014), the validity of parental reports has been demonstrated (Varni et al., 2007) and the proxy assessment can be very useful to obtain additional information about the children's state (Ellert et al., 2011).

Because of the difficulty in recruiting, during the summer season, a control group not participating in the program, the study population was stratified by PA and RA duration (Figure 3). Even if the stratification was not random, the potential bias due to possible differences in the distribution of age, gender, and baseline score was bypassed through model adjustment. Children spending more time in PA reported more worsening in their physical well-being, which may be ascribed to the physical tiredness resulting from the two weeks of intense PA. However, spending more time in PA was associated with more improvements in *emotional well-being* and *self-esteem*, as already reported in the literature (Ekeland et al., 2004). Of note, children who participated for a longer time in RA reported more improvements in social relationships (*family* and *friends*), which may be ascribed to the positive effect of group activities in promoting social wellbeing, supporting positive peer interactions and developing social skills (Fredricks & Simpkins, 2013). Parents reported somewhat differently on the *friend* domain, probably because they may not be present while children meet their friends. Indeed, the child-parent agreement was better for the family domain, in which parents are directly involved.

Several cross-sectional studies confirmed that children and adolescents who engage in increased levels of PA have better physical and mental health than those who lead a sedentary lifestyle, irrespective of weight status, age, sex and socio-economic characteristics (Iannotti et al., 2009; Janssen & LeBlanc, 2010; Ussher et al., 2007). Previous studies on summer interventions implemented to promote PA did not assess HRQoL improvements (Tang et al., 2014) or included small and selected cohorts of subjects (Pierce et al., 2017). The few projects reporting a slight improvement in children's QoL lasted 9–12 months were set in the school environment and were based on extra PA sessions, daily short activity breaks and PA homework (Casey et al., 2014; Hartmann et al., 2010; Quaresma et al., 2014). Similarly, other family or community-level interventions lasting 8 weeks yielded improvements in QoL maintained after 6–12 months (Chen & Kwan, 2016; Fenner et al., 2016).

In the current study, HRQoL was assessed before and after a two-week (short) summer program promoting PA. The decrease in physical wellbeing observed in children spending more time in PA might be reasonably ascribed to the tiredness felt soon after the intense PA carried out during the previous weeks. Similarly, the beneficial effects on the other HRQoL domains might be reasonably ascribed to the recent activities carried out during the summer camp.

During one of the first editions of *Giocampus summer*<sup>®</sup>, a high prevalence of sedentary habits was reported in the week before the camp with most of the children watching television 6 days per week for a mean time of 100 minutes per day (Fainardi et al., 2009). These data emphasize the need for programs like *Giocampus*<sup>®</sup>, created to encourage positive attitudes towards PA and for counteracting the risk of obesity, cardiovascular diseases, and depression. Notably, the *Giocampus summer*<sup>®</sup> program is easy to implement, but it requires appropriate facilities to offer the participants a suitable place to safely practice PA and trained instructors to encourage engagement in the activities. Furthermore, the role of the schools, local government and sponsors is essential for the successful involvement of the families in the program.

Some study limitations have to be acknowledged. The study population was not compared with a control group not participating in the program. However, the reports of different domain score changes according to PA duration (Figure 3) might suggest that the PA carried out during the summer camp did have a role in the observed HRQoL differences.

The Kindl® questionnaires used for the HRQoL assessment was not specifically validated in Italian populations, as well as Italian reference values are not available. However, the official Italian translation used in the present study ([www.kindl.org/english/language-versions/italian](http://www.kindl.org/english/language-versions/italian)) has already been administered to Italian samples in previous studies (Iguacel et al., 2017; Sacchetti et al., 2007).

The levels of PA were not assessed by objective methods, such as specific questionnaires or accelerometers, but all children actively participated in the activities both in the morning and in the afternoon, under the supervision of a professional trainer who constantly motivated the children. Moreover, other potentially influential variables such as PA habits before the program, BMI or socio-economic status were not investigated.

At last, the assessment of HRQoL in the long-term was not included in the current study objectives. Although the preliminary results were positive, further longitudinal studies are needed to address this aspect.

## Conclusions

The current study highlighted some HRQoL improvements after a short program based on daily PA schedules. Investing in primary prevention programs promoting PA during childhood may be helpful in motivating school-aged children to undertake healthy lifestyle choices.

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## Author contributions

VF: conceptualization and design of the study, investigation, supervision, drafting and revision of the manuscript. SF: study methodology, investigation, data curation and analysis, drafting and revision of the manuscript. CM: investigation, supervision, revision of the manuscript. EV: supervision of the study, revision of the manuscript. SLG: conceptualization and design of the study, revision of the manuscript. MV: conceptualization and design of the study, methodology, supervision, revision of the manuscript.

All authors approved the final manuscript and are accountable for all aspects of the work.

## Disclosure statement

The authors declare that they have no competing interests.

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## Data availability

Data are available upon request.

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