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# Ability of a Game-Based Intervention to Promote Physical Activity in Mexican Children

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## Abstract

Several reports indicate that sedentary lifestyle is common around Mexican children and that public policies haven't been enough to modify this problem. Considering the existing high prevalence of obesity in Mexico, sedentary lifestyle becomes a major interest topic in health. A program which includes ludic activities (sports and traditional children's games), to promote physical activity was designed, executed and assessed in children that come from low-income families in Mexico City. The amount and intensity of physical activity in this sample was evaluated using Actigraph GT3X accelerometers and the results were compared with actual international recommendations. The results show that children significantly increased they physical activity counts but International recommendations for physical activity, in terms of intensity and time, were not reached during the execution of the program, even though children were engaged in ludic activities during four hours each day. The average goal achievement was only 18.01%. Our results show that our program needs modifications in its design and execution strategies in order to achieve physical activity goals. Additionally we consider that actual physical activity recommendations seem to be very difficult to reach on regular daily conditions of these children where neither school nor home environments promote healthy lifestyles.

**Keywords:** Mexico; Obesity; Sedentary life style; Physical activity program

## Introduction

In Mexico, the prevalence of overweight and obesity in children from 5 to 11 years of age is 34.4%, representing five times the international estimated prevalence data for 2010 (6.7%) [1,2]. Though it has been widely documented that physical activity is positively related to the reduction of obesity and cardiovascular risk [3-6], actual physical activity practice is very far from international recommendations in the Mexican children population. It has been reported for Mexico, that in the school environment there are few opportunities to do physical exercise of moderate or vigorous intensity and that the physical activity level decreases as school grades increment [7,8]. Lack of physical areas and environments that promote physical activity in school and non-school spheres, may explain part of this problem [8].

The existing therapeutic positions, point out the physical activity promotion as an imperative strategy to prevent and treat children obesity [9-11]. Guidelines around the world, indicate that children should be engaged in 60 or more minutes each day of physical activity which must be at least of moderate intensity and that three or more days be vigorously intense [12-15].

The objective of the current study was to evaluate the ability of a game-based intervention to promote physical activity in children and to contribute in this way to achieve the physical activity recommendations.

## Materials and Methods

A physical activity program was implemented with children from low-income families that attend public schools in Mexico, City. We counted with the informed consent of the parents and the assent of the children, who were involved in the program daily during three weeks. Convenience sampling was used to select participants. The activity program was executed twice, in summer of 2011 and 2012, and the integrated sample included 371 children.

We assessed in what extent, physical activity goals (60 minutes/day of moderate activity) were reached during the execution of the program "Jugando a ganar salud" (Playing to get healthier). In the development of the program, during three weeks, children were involved, for

4.5 hours/day, in traditional games and sports. The design of the program was consistent with WHO recommendations for children, which indicate that physical activity goals must be accomplished with enjoyable activities that are appropriate for their age. In addition; we reinforced knowledge, abilities and positive attitudes toward the importance of an active lifestyle.

The implementation of the program was in charge of trained Nutrition and Dietetics students. Physical activity was quantified with accelerometers (ActiGraph GT3X) assessing total minutes and the distribution of the total counts into different intensity activities: light, moderate and vigorous. The average counts were compared with the 60 minutes recommendation (one sample t-test); also, percentages of agreement were calculated in relation with the same goal.

## Results

371 children integrated the sample: 187 children that participated in the first summer program in 2011, and 184 in 2012.

Each child used the accelerometers three times during the time of the program (three weeks). Physical activity was measured as total time and time in different intensity levels (sedentary, light, moderate and vigorous). The average time that the accelerometers registered for sedentary activity was 72.1 minutes/day. Even though average time of non-sedentary activity was more than an hour (72.7; SD 22.86 minutes), the greatest proportion of the time was spent on lightly intensity activity, corresponding, in average, to 85.9% of the total time (Figure 1). Half of the children reached less than 15% of the indicated time for moderately

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**Received** June 03, 2013; **Accepted** June 25, 2013; **Published** June 27, 2013

**Citation:** Haua-Navarro K, Moreno-Landa LI, Rocha-Aguilar R, Pérez-Lizaur AB, Pérez-Rodríguez M, et al. (2013) Ability of a Game-Based Intervention to Promote Physical Activity in Mexican Children. J Obes Weight Loss Ther 3: 179. doi:[10.4172/2165-7904.1000179](https://doi.org/10.4172/2165-7904.1000179)

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intense activity (60 minutes) and the average goal accomplishment was of only 18.01% (SD:13.5 minutes) of the recommendation. The maximum achievement of the goal for some kids was 66.67%, finding also some children that could not even reach one minute of moderately intense activity. In summary, time of moderate intense activity was statistically different to the recommendation ( $t$ -test  $p=0.000$ ).

Some positions statements about physical activity for children indicate that the total activity goal may be achieved in different moments throughout the day, emphasizing that each moment of moderate/vigorous intensity must last ten minutes or more. For the studied sample, the average time for the activity bouts was of 3.45 minutes and the average number of ten-minutes-bouts was only of 0.25/day.

Across studies, 60 minutes of MVPA in primary/elementary school children appears to be achieved, on average, within a total volume of 13,000 to 15,000 steps/day in boys and 11,000 to 12,000 steps/day in girls [16]. The average number of steps of these children was 4119.05 (SD 1191.45), reaching the 37.36% of the lowest bound of this recommendation.

## Discussion

Regular physical activity in children provides important protection from developing chronic diseases such as hypertension, cancer, type II diabetes, cardiovascular disease, and obesity. Physical activity during childhood may also increase mental health by reducing clinical manifestations of depression and anxiety and by improving self-esteem, self-perception of competence, and body image [17,18]. In this study we were not able to evaluate any of these long-lasting benefits of the program, but considering that physical activity patterns are often established early in life, it is important to promote regular physical activities to young people as this program did.

We consider that conducting the workshop in a playful ambiance promotes greater long-term adherence to physical-activity habits, though we are conscious about the challenge for an intervention of this type to adopt them as their own. The participation of parents, and the community is basic for promoting and active life-style; as well as and the existence of public policies support and the availability of safe installations to encourage the practice of physical activity

The fact that children engaged in the program didn't reach international goals though they were really motivated and directed to do it was unexpected. We are aware that international recommendations for physical activity are based on evidence about

amount and intensity of physical activity related with health benefits, but we want to emphasize the necessity of thinking about how realistic are international goals of physical activity, particularly in marginalized population were a lot of sociocultural characteristics discourage healthy lifestyles. Independently of this reflection, modifications in the design of the program are planned for its future applications in order to reach better results that favor significant benefits in the long-term.

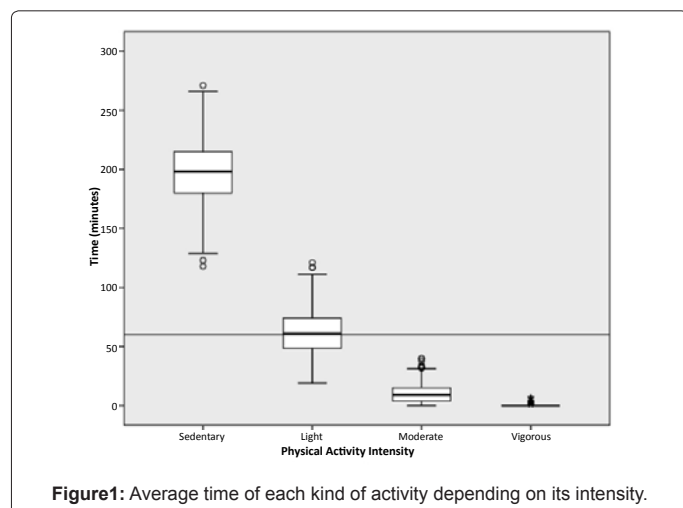
## Acknowledgement

The authors are grateful to the following persons who made execution of the program possible: Linda Yafa Essesldi; Adriana Flores-López; Carla Sosa-Alvarado; Elena Paola Kegel-Sánchez; Jessica Bukrinsky; Tania Tostado; Pamela Morales; Rita Shlam; Vanessa Camacho, and Sandra Olvera, and likewise to Comedores Santa María, A.C. for facilitating their installations.

Funding source: The Universidad Iberoamericana (UIA), Mexico City, and the Fundación Mexicana para la Salud, A.C. (FUNSALUD), sponsored this study.

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**Figure1:** Average time of each kind of activity depending on its intensity.