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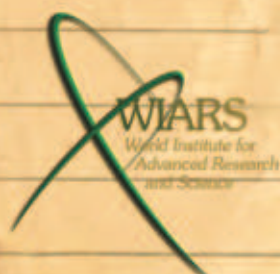
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INTERNET INTERVENTIONS IN PHYSICAL ACTIVITY AND DIETARY BEHAVIOR FOR ADOLESCENTS – WITH OR WITHOUT SCHOOLS?

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Abstract

Purpose of Study: To perform a review on internet interventions for adolescents focusing physical activity and dietary behavior and to understand the effect of schools and teachers involvement in the outcomes.

Background: Although the well known benefits of a healthy lifestyle (high physical activity levels and a healthy eating pattern), the adolescents of most industrialized countries fail to meet dietary and physical activity guidelines.

Most governments are trying to find effective interventions that may focus in a wide range of individuals, rather than face to face (school based) interventions.

The internet has been used recently in a lot of health interventions, its advantages have been mentioned broadly, especially when targeting children and adolescents.

Recent reviews on similar topics are not coherent on their conclusions, some are in favour of the computer based interventions, others mention that there is no clear effectiveness of eHealth interventions. However no studies exclusively on adolescents were found. It seems relevant to perform an updated review, focusing studies with adolescents.

Methods: Articles were identified for inclusion using key word database literature searches. An initial search using electronic databases: Medline, ISI Web of Knowledge, Elsevier and Ebsco was performed, using as key terms: Internet Intervention; Web based intervention or online intervention. The search was completed using the Boolean term “and” with expressions: nutrition; diet; physical activity; exercise or motor activity. The full text review was done according to a matrix developed in a Microsoft windows excel database. It was calculated a quality score, based in nine methodological items.

Conclusions and discussion: Most of the papers reviewed had modest results in favour of the intervention group, but failed to show long term effects, when evaluated.

Less than 50% of the studies involved teachers, schools, parents or group leaders, and no relation was found between this involvement and the outcomes.

This review shows that besides the importance of interventions for adolescents, few studies are published. The improvement in diet and physical activity outcomes seem modest and not long term, either with the involvement of schools or not. Schools should evaluate and improve the health education programmes. The authors suggest that more interventions should be planned including innovative methodologies, as so much is still to be known in how to improve health behaviours in adolescents.

Keywords: Health education, physical activity, nutrition, adolescents

1. Introduction

Physical Activity and diet are the two main modifiable behaviors that may interfere with most diseases, in all ages. Childhood and adolescence are the age

groups that should have the focus from most interventions, since lifestyle adopted in these ages, namely the eating and physical activity behaviors have been mentioned as a cause for overweight and obesity in childhood, adolescence and later on adult years. (G. Rodriguez, 2006; S. S. Guo, 1999)

Although the well known benefits of a healthy lifestyle: physically active and a healthy eating pattern, the population of most industrialized countries fail to meet dietary and physical activity guidelines. (Rhonda S. Sebastian, 2008)

As a method to fight this reality, most governments are trying to find effective interventions that may focus in communities and a wide range of individuals, rather than face to face, individual interventions. School based interventions have been traditionally chosen as the best strategies to target adolescents, however the new technologies, specially the internet have been used recently in a lot of health interventions, in all age groups. (Corneel Vandelanotte, 2007; Gregory J. Norman, 2007) Considering world health recommendations for children and adolescents health interventions, school and teachers involvement is crucial for the success and goal achievement

Internet advantages have been mentioned broadly: personalization of experience, enhancement of cultural sensitivity, (Nigg, 2003) fastest access to information, at any time and place, (CO Cummins, 2004; J Brug, 2005) ability to keep information updated and accurate at a low effort and cost, (J Brug, 2005) possibility of anonymous participation, possibility of a more frequent contact and support asynchronously. (KYA McKenna, 2000) Interactive tools, such as discussion forums or boards, e-mail exchange and virtual meetings, may permit the sharing of experiences between participants. (KYA McKenna, 2000) Mentioning the characteristics that please children and adolescents, it has to be referred the attractiveness of the educational games, the website design and the possibility of using a technology of information and communication. (Thompson, 2010)

Recent reviews on similar subjects are not coherent on their conclusions. Some suggest the effectiveness of internet/ computer interventions, others conclude the opposite, but non focus on adolescents. Little is known about schools and teachers involvement in these internet based interventions.

The current study aims to perform a review on internet interventions for adolescents focusing physical activity and dietary behavior and to understand the effect of schools and teachers involvement in the outcomes.

2. Methods

2.1. Data Sources and Search terms

Articles were identified for inclusion using key word database literature searches.

An initial search using electronic databases: Medline, ISI Web of Knowledge, Elsevier and Ebsco was performed, using as key terms: Internet Intervention; Web based intervention or online intervention. The search was completed using the Boolean term "and" with expressions: nutrition; diet; physical activity; exercise or motor activity.

No time frame was defined considering the small amount of internet intervention studies directed to adolescent samples.

2.2. Data Sources and Search terms

Articles were included in the review if the abstract, title, or key words indicated that the studies focused on a Diet or Physical Activity Internet Based Intervention for adolescents. Inclusion criteria limited articles to randomized control trials or quasi-experimental studies; publications in a peer-reviewed journal and availability in English.

Publications were not included if title or abstract suggested a sample different than adolescents, if it were Review articles, if it were not an article, if it did not focus on physical activity, eating behaviour or weight control, if it were not an internet intervention. Interventions including a mixed method were included if the main method was web-based.

All articles resulting from the first search criteria were included for abstract review. In this phase duplicate articles, articles focusing on parents or non adolescent populations; conference documents and papers reporting non intervention researches were excluded. Interventions including non adolescent groups were included if there were separate results for the adolescent group.

Finally, 45 articles were included for a more extensive review, from these 10 corresponded to all inclusion criteria.

2.3. Data Extraction

The full text review was done according to a matrix developed in a Microsoft windows excel database, developed based on previous studies review criteria (Corneel Vandelanotte, 2007; Gregory J. Norman, 2007; Nancy L. Cohen, 2011). The following headings were analyzed: Publication Information (author, title, journal, year of publication); adolescents' characteristics [age; gender; sample (size, calculation and control group); equivalence of groups at baseline; different groups created; nationality; ethnicity; other characteristics of relevance]; Methods: Project (Study design; Theoretical framework; individual randomization; isolation of technology; pre and post test design; retention rate; missing data analysis) Intervention characterization (objectives, main focus areas/ behaviour targeted, setting; resources/ intervention technologies; resources/ control conditions; engagement, teacher or family support, year of intervention and length/ duration); About Internet (format; frequency; interactivity); Intervention Evaluation (measures; measurement methodology; PA objectively measured?; Diet measurement?; validated measures?; results/ effects; recommendations); and Additional Comments. These headings were subsequently collapsed into the results table.

It was also calculated a quality score, as mentioned in a previous study (Gregory J. Norman, 2007), based in nine methodological items. The presence of an item was score with one point, for a total of nine items /points, the original authors criteria was considered.

3. Results

The analyzed studies had a mean quality score of 6.1 (max=9; min=2) out of 9.

The studies involved adolescents with a mean age of 13.8 +/- 1.83, varying from 12 to 18.1 years. 60% of the interventions were directed to both genders, mainly for American adolescents (60%).

Sample sizes were very different between studies, the smallest one used 21 individuals and the largest sample included 473.

The intervention project was based in a theoretical framework in 50% of the cases, mostly Social Cognitive Theory (30%). Website technology was used in 80% of the studies included in this review, but it was also found e-mail support and cell phone related technological devices. Most of the studies (60%) did not involve schools or teachers. In average the duration of the intervention was 8.6 +/- 4.24 weeks.

90% of the interventions had positive results when compared to the baseline data, however only 50% had significantly better results than the control group. Table 1 shows the main results.

No significant association between the involvement of schools and the results of the intervention (versus baseline or versus control group) was found.

Most of the papers reviewed had modest results in favour of the intervention group, but failed to show long term effects, when evaluated.

Sample Characteristics		
Mean Age	Mean; SD	13.8; 1.83
	Minimum	12.0
	Maximum	18.1
Gender (%)	Female	20.0
	Male	20.0
	Both	60.0
Nationality	American	60.0
	Australian	10.0
	German	10.0
	Chinese	10.0
	Not mentioned	10.0
Intervention Project		
Theoretical Framework (%)	Social Cognitive Theory	30.0
	Cognitive Behavioral Theory	10.0
	Transtheoretical Model	10.0
	Not mentioned	10.0
Sample Size	Mean; SD	198.7; 165.60
	Minimum	21
	Maximum	473
Technology used (%)	Computer	10.0
	Website	80.0
	Other	10.0
School/ Teachers Involvement (%)		40.0
Duration	Mean; SD	8.6; 4.24
	Minimum	2.0
	Maximum	16.0
Improvement Results (%)	Versus baseline data	90.0
	Versus control group	50.0

4. Conclusions and Discussion

This review shows that besides the importance of physical activity and dietary interventions for adolescents, few studies are published. All the studies included featured the internet or other interactive technologies, expecting to facilitate the improvement in health behaviours.

It seems evident that these interventions improve behaviours compared to the baseline data, suggesting efficacy in a lower budget, as previously mentioned. However it is still not clear if including the new technologies have more significant results as the traditional methods.

There may be a theory based or a dose effect as extremely different approaches were found. Although specific recommendations for these interventions are needed, we found no sufficient evidence to make such recommendations.

WHO recommends involving schools in health promotion intervention for children and adolescents (WHO, 2009); however in this review we found that only 40% of the studies did so. Further on we investigate the association of this involvement with the results, and found no statistical significance. More studies are needed to confirm the magnitude of the benefits of including schools and teachers.

The improvement in diet and physical activity outcomes seem modest and not long term, either with the involvement of schools or not. Schools should evaluate and contribute to the improvement of the health education programmes.

Regarding the overall quality of the study design most studies reviewed had high scores, however 20% had a negative quality (score <2).

The authors suggest that more interventions should be planned including innovative methodologies in along with schools/ teachers, as so much is still to be known in how to improve health behaviours in adolescents.

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