

## Abstract

**Background:** Health school promotion is sustained by several research and practice over the last 50 years, and was improved during the 90's, as a structured and effective initiative, led by WHO in collaboration with the European Commission and the Council of Europe.

In western societies behavioral changes are extremely difficult and the diets preferred by most adults, and increasingly by most children, adversely affect health and consequently conduct to a substantial rise in chronic diseases, including diabetes, heart disease and cancer.

Non communicable diseases associated to food habits, obesity in children and adolescents and levels of physical activity are challenges to public health.

Scientific research recognizes physical activity and fruit and vegetables consumption as health protective factors, making relevant the study of its determinants and to explore how more nutrition and food knowledge or more self-efficacy is related with healthier attitudes in these domains.

The evidence in nutrition and food knowledge related to food behavior is scarce.

Self-efficacy has recurrently been considered a good predictor of health behavior.

The research on these associations is still scarce, namely for adolescents' population of southern Europe. On the other hand is important to assess the adaptation of instruments that can accurately measure these dimensions.

**Objectives:** The aims of this study were to adapt and assess the Turconi *et al* (2003) dietary questionnaire on food habits, eating behaviour and nutritional knowledge of adolescents; to evaluate the relation between food and nutrition knowledge and eating behaviour, physical activity and self-efficacy; to evaluate the relation between nutrition and physical activity self-efficacy and attitudes in adolescents.

**Participants and Methods:** The subjects were students (n = 840, aged 12-19 y, both sexes) from an urban secondary school of the north of Portugal, in Porto metropolitan area. The adapted questionnaire contained 8 questions on personal data followed by sections: Food habits – 14 items); Physical activity and lifestyle – 6 items; Food knowledge – 10 items; Self-efficacy – 8 items; Nutrition knowledge – 7 items; and Food frequency – 4 items. It was self-administered to study participants, after informed written consent obtained from parent's subjects. Reliability was assessed using Cronbach's alpha. To assess the scale items dimensions principal component analysis was used and for the dichotomized scales latent trait models were used. To examine the association between domains and their determinants, Spearman's coefficient (r) and regression coefficients ( $\beta$ ) were used with

multivariate linear model to adjust for possible confounders (sex, age, parental education and BMI- according to Cole's criteria).

**Results:** Cronbach's alpha ranges from a minimum of 0.48 ("Food and nutrition knowledge") to a maximum of 0.67 ("Physical activity") indicating a fair to moderate internal consistency. There is some construct validity supported by the results (boys and younger adolescents are more active physically than girls and older adolescents). Measurements of the association of the adapted questionnaire with other measures of the same domains or related domains indicated criteria validity.

"Food and nutrition knowledge" (adjusted for sex, age, parental education and BMI- according to Cole's criteria) showed positive and significant associations with "Food habits", "Self-efficacy", "Physical activity and lifestyle" and "Fruit and vegetables consumption" ( $p < 0.001$ ). "Self-efficacy" was also positively associated with "Food habits", "Physical activity" and "Fruit and vegetables consumption". After adjustment for self-efficacy, "Food and nutrition knowledge" still revealed a positive and significant related with healthy "Food habits".

Significant statistical interaction was found between "Food and nutrition knowledge" with "parental education" for the association with "Fruit and vegetables consumption" ( $p < 0.013$ ), showing that the positive effect was only present in the lower classes of parental education (1-6<sup>th</sup> grade)  $\beta = 0.031$  (IC95% -0.011; 0.073) and (7-12<sup>th</sup> grade)  $\beta = 0.032$  (IC95% 0.016; 0.048).

Also an interaction was found between "Self-efficacy" and sex for the association with "Food habits" ( $p < 0.012$ ). The positive effect was found in females [ $\beta = 0.320$  (IC95% 0.199; 0.440)] but not in males [ $\beta = 0.078$  (IC95% -0.064; 0.221)].

**Conclusions:** The adapted questionnaire has construct validity and acceptable reliability.

Higher levels of "Food and nutrition knowledge" were independently associated with higher levels of self-efficacy and healthy "Food habits", namely with higher fruit and vegetables consumption.

"Fruit and vegetables" consumption is higher for adolescents with higher levels of "Food and nutrition knowledge" whose parents belong to the lower classes of education.

An higher self-efficacy was also related with an healthier "Food habits", particularly in females.

