



# International Journal of Clinical and Health Psychology

www.elsevier.es/ijchp



## ORIGINAL ARTICLE

# Self-determined motivation, physical exercise and diet in obese children: A three-year follow-up study



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Received 25 July 2013; accepted 10 December 2013

Available online 29 April 2014

### KEYWORDS

Autonomous motivation;  
Self-Determination Theory;  
obesity;  
children;  
quasi-experimental study

**Abstract** The present study's objective was to track long term (three years intervention and six months "detraining") the influence of an exercise program with or without diet on the motivation of sedentary obese children. The participants were 27 children (8-11 years), divided into two groups according to the program they followed. The G1 group followed a physical exercise program (three 90-minute sessions per week), and the G2 group this physical exercise program plus a low calorie diet. The participants' motivation to engage in exercise was measured using the Behavioural Regulation in Exercise Questionnaire-2. Both groups showed improvements in amotivation in the 3rd year and in the detraining period (in the G1 and G2, respectively) and in intrinsic regulation of exercise behaviour (in the G1 and G2, respectively). There were also differences between the two groups in external regulation in the intervention and detraining periods. This appears to be indicative of the appropriateness of long-term physical exercise to generate greater autonomous motivation, and hence changes towards healthy living habits that are stable in time.

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### PALABRAS CLAVE

Motivación autónoma;  
Teoría de la Auto-Determinación;  
obesidad;  
niños;  
cuasi-experimento

### Motivación autodeterminada, ejercicio físico y dieta en niños obesos: un estudio de seguimiento a tres años

**Resumen** El objetivo del presente estudio fue realizar un seguimiento a largo plazo (tres años y seis meses de intervención "desentrenamiento") sobre la influencia de un programa de ejercicio físico con o sin dieta sobre la motivación de los niños obesos sedentarios. Los participantes fueron 27 niños (8-11 años), divididos en dos grupos. El grupo G1 siguió un programa de ejercicio físico (tres sesiones de 90 minutos por semana) y el grupo G2 siguió este programa de ejercicio físico más una dieta baja en calorías. La motivación de los participantes para participar en el ejercicio se midió usando el Cuestionario de Regulación de la Conducta en el Ejercicio

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Físico-2. Ambos grupos mostraron mejoras en la desmotivación en el tercer año y en el período de desentrenamiento (en los grupos G1 y G2, respectivamente) y en la regulación intrínseca de comportamiento de ejercicio (en los grupos G1 y G2, respectivamente). Esto parece ser indicativo de la idoneidad del ejercicio físico a largo plazo para generar una mayor motivación autónoma y por, lo tanto, los cambios hacia hábitos de vida saludables son más estables en el tiempo.

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The prevalence of childhood obesity has increased substantially over the past three decades worldwide (Han, Lawlor, & Kimm, 2010). Using the obesity criterion of the International Obesity Task Force, it is estimated that the global prevalence of obesity in children and youngsters (5-17 years) is approximately 3.2%, and in Europe it reaches 4% (Lobstein, Baur, & Uauy, 2004). Recommendations for the treatment of childhood obesity focus on lifestyle changes, including increased physical activity (PA) and the promotion of healthy eating habits (Han et al., 2010). Thus, the World Health Organization recommends that individuals in this age group should accumulate at least 60 minutes daily of mainly moderate or vigorous aerobic PA, and at least three times a week perform activities that develop locomotor strength (World Health Organization [WHO], 2010). However, the international Health Behaviour in School-Aged Children study (WHO, 2010) indicates that only 27% of girls and 40% of boys meet these PA recommendations.

Obese children are less physically active than their leaner peers (Deforche, De Bourdeaudhuij, D'hondt, & Cardon, 2009). It remains unclear why overweight or obese individuals are less willing than normal weight ones to be involved in physical activity (Hwang & Kim, 2011). Studies in this regard indicate the benefits of physical activity and exercise in this population (Escalante, Saavedra, García-Hermoso, & Dominguez, 2012; García-Hermoso, Saavedra, & Escalante, 2013; Saavedra, Escalante, & García-Hermoso, 2011). Thus, interventions of an aerobic nature (3 sessions of 60 minutes weekly) seem to generate changes in aerobic fitness (Saavedra et al., 2011), lipid profile—mainly in LDL and TG (Escalante et al., 2012), and resting blood pressure (García-Hermoso et al., 2013).

Self-Determination Theory (SDT) has been used to identify relationships between the initiation of physical activity, adherence to it, and the psychological variables influencing obese children (Deforche, De Bourdeaudhuij, & Tanghe, 2006). Understanding these relationships is important in designing strategies for the promotion of physical activity to prevent weight gain and to treat obesity among adolescents (Hwang & Kim, 2011). In this regard, there has been extensive application of SDT approaches in research in the field of obesity and physical activity (Hwang & Kim, 2011; Verloigne et al., 2011). These studies indicate that obese children with high levels of intrinsic motivation have greater adherence to physical exercise programs designed to lose weight compared with their counterparts with low levels of such motivation (Hwang & Kim, 2011; Verloigne et al., 2011). Likewise, overweight and obese adolescents present higher scores on demotivation and extrinsic motivation, but lower

scores on intrinsic motivation than their normal weight counterparts (Hwang & Kim, 2011). Since specific treatment programs are needed to address obesity, it is interesting to analyse how they might impact the different types of motivation towards physical activity. It seems that children's obesity treatment programs can increase autonomous forms of motivation towards PA during treatment, provided that particular attention is paid to autonomy, competence, and relatedness (Verloigne et al., 2011). Such treatments should, in as far as possible, try to minimize control (Verloigne et al., 2011) and offer activities that are fun and attractive (Deforche et al., 2006). In the management of overweight, it is essential to make a particular effort to increase physical activity adherence (Annesi & Johnson, 2013; Deforche, Haerens, & De Bourdeaudhuij, 2011). However, these treatments (in particular, residential treatments) appear to exert pressure on obese individuals to carry out physical activity and lose weight, and, if one accepts the assumptions of SDT, this could negatively impact their autonomous motivation (Verloigne et al., 2011). Indeed, reducing motivation to its quantitative dimension could be a major limiting factor in current weight loss interventions (Teixeira, Silva, Mata, Palmeira, & Markland, 2012). It therefore seems necessary to determine whether longitudinal interventions foster greater motivation, and if so, whether this motivation is maintained over time (Hwang & Kim, 2011), promoting healthy lifestyles in obese children. The objective of the present study was therefore to track long term (three years intervention and six months "detraining") the influence of an exercise program with or without diet on the motivation of sedentary obese children.

## Method

### Participants

A total of 135 subjects were invited to participate through the collaboration of various schools in the town of Cáceres (Spain). The inclusion criteria were: (i) a body mass index (BMI) equal to or greater than the 97th percentile for the age and sex of the subject; (ii) age between 8 and 11 years as defined by Spanish population curves (Hernández et al., 1988). Subjects were excluded if they were: (i) regularly practising PA, or following an exercise program or some other therapy ( $n=65$ ); (ii) involved in any weight control program ( $n=18$ ); (iii) were taking any medication ( $n=8$ ); (iv) had any type of dysfunction limiting their physical activity ( $n=2$ ); other reasons ( $n=9$ ). The final sample comprised 27

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