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Negative correlation between BMI and perception of physical activity in adolescents

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ABSTRACT

The development of obesity is a complex problem, conditioned by heterogeneous factors. Despite the impressive amount of research, the phenomenon is difficult to investigate, due to the inadequacy of quantitative methods to assess the negative spiral that triggers between self-efficacy perception and physical activity levels. The present study uses tools from quantitative research relating to conditional motor skills and tools coming from qualitative research relating to psychological factors. The hypothesis is that overweight affects not only motor performance, but also related psychological factors (perceived self-efficacy and enjoyment). The survey was conducted on a group of 177 adolescents (85 males and 92 females) aged between 14 and 18 years in the Puglia region. The subjects, once the quantitative tests were carried out, completed the PAQ_C scales (levels of physical activity in the last week), PACES (Physical Activity Enjoyment Scale) and Motor Self-efficacy questionnaire. Attested a negative relationship between overweight and motor tests results, a Spearman ranks correlation analysis was carried out to investigate the BMI relationship with the scores obtained at the qualitative scales. A negative correlation was identified between BMI and the scores of scales for all subjects (rs = -0.03; -0.15; -0.09 for PAQ_C, PACES and SEM). Based on the analysis of the collected data, adolescents with a high BMI have a high probability of developing adverse perceptions of their effectiveness and facing a high risk of sedentary behaviours. **Keywords**: BMI; Self efficacy; Levels of physical activity.

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INTRODUCTION

The development of obesity is a complex problem, conditioned by heterogeneous factors including genetic predispositions, eating habits, socio-cultural factors and physical inactivity (Krebs & Jacobson, 2003). Recent scientific evidence warns that the sedentary habits of children and young people are among the main causes of the decline in motor skills and predispose the body to various non-communicable diseases, often linked to obesity (Colella, Morano, Bortoli, & Robazza, 2008). The factors that can influence the probability that a child or adolescent is physically active are multiple: gender difference, family and peer group attitude with respect to physical and sports activities, self-efficacy perception, self-perception of physical and sports competence, accessibility (physical, social, economic, cultural) of structures, self-esteem, socio-cultural perspectives related to physical activity and sport (D'Isanto, Manna, & Altavilla, 2017). Despite the impressive amount of research on the subject, the phenomenon is difficult to investigate, mainly due to the inadequacy of quantitative methods to assess the negative spiral that triggers between perception of self-efficacy and levels of physical activity: overweight children and adolescents tend to develop a difficult relationship with one's body and one's peers, resulting in isolation, which often results in further sedentary habits (Valentini, Riccardi, Raiola, & Federici, 2018). For this reason, the most recent scientific literature has turned to investigation systems that combine the hybridisation of qualitative and quantitative data, methods, methodologies and paradigms in research studies (mixed research). The present project uses tools from quantitative research relating to conditional motor qualities (strength, speed, coordination) and tools coming from qualitative research relating to related psychological factors (Enjoyment, Levels of physical activity, perceived self-efficacy). The hypothesis is that overweight affects not only motor performance that involves moving the body horizontally and vertically, but also on related psychological factors (perceived self-efficacy and enjoyment).According to Van Zant & Toney (Van Zant & Toney, 2012), research has demonstrated relationships between BMI or body composition and children's perceptions of PA (Anderson, Bandini, Dietz, & Must, 2004) Kelly et al. demonstrated an inverse relationship between BMI and moderate-to-vigorous PA in sixth-grade girls (Kelly et al., 2010). Other studies have shown similar relationships between predilection or inclination for movement and body fat percentage in obese 8–12-year-old girls (Anderson, Bandini, Dietz, and Must, 2004), and BMI and 11–12-year-old Swedish children's physical self-perceptions (sports competence, body attractiveness, physical strength, and physical condition) as sub-domains of their measurement of global self-esteem (Raustorp, Ståhle, Gudasic, Kinnunen, & Mattsson, 2005).

This work is a preliminary study on a set of data collected in the Puglia region, in southern Italy. The aim is to investigate the BMI relationship with the scores obtained at the qualitative scales.

As suggested by Van Zant et al., if increased BMI category would be inversely correlated to positive self-perceptions of PA, BMI category might prove helpful as assessment of identifying those children most likely at risk for sedentary lifestyles.

In this case (negative correlation), our aim is to extend the study comparing qualitative and quantitative instruments cited above.

MATERIALS AND METHODOLOGY

The survey was conducted in the Puglia region on a group of 177 adolescents (85 males and 92 females) aged between 14 and 18 years. The subjects involved, having measured the variables related to weight, height, age and BMI, once the quantitative tests were carried out, completed PAQ_C (Crocker, Bailey, Faulkner, Kowalski, & McGrath, 1997; Kowalski, Crocker, & Faulkner, 1997), and PACES scales (Physical

Activity Enjoyment Scale) (Kendzierski & DeCarlo, 1991) and the Motor Self-efficacy questionnaire (Bandura, 1997; Colella et al., 2008).

The Physical Activity Questionnaire for Older Children – PAQ-C (Crocker, Bailey, Faulkner, Kowalski, & Mcgrath, 1997) is a self-administered 7-day recall instrument, divided into nine items that aim to evaluate the amount of the moderate to vigorous physical activity (MVPA) performed. Final score ranged 1–5 points, with 1 indicating low MVPA, whereas a score of 5 indicated high MVPA.

Relating to enjoyment, despite the importance of the enjoyment construct, a few researches has been conducted to address the development of specific assessment tools. An exception is the Physical Activity Enjoyment Scale (PACES) proposed by Kendzierski and De Carlo. The authors conducted two validation studies providing evidence for the reliability and validity of the scale (Kendzierski & DeCarlo, 1991).

The PACES questionnaire (Physical Activity Enjoyment Scale) assesses the level of individual satisfaction with physical activity, and has been validated in the Italian context by Carraro, Young, & Robazza (Carraro, Young, & Robazza, 2008).

The motor self-efficacy questionnaire is aimed at detecting the personal perception of motor efficacy (Colella et al., 2008), that is the trust the student places in his / her ability to know how to successfully face a specific situation (Bandura, 2001).

All the instruments selected refer to two fundamental principles of human behaviour (Martens, 1996):

1) The principle of personal development, through the acquisition and improvement of multiple motor skills;
2) The principle of fun, through varied and enjoyable motor activities proposed according to a methodology adapted to the age of the students. Motor suggestions that respect both principles tend to raise the intrinsic motivation of the student, to develop positive attitudes towards physical activity and to promote healthy habits of movement.

Attested a negative relationship between the condition of overweight or obesity and the results of the motor tests, a correlation analysis was carried out for Spearman ranks to investigate the BMI relationship with the scores obtained at the qualitative scales.

RESULTS

Table 1 summarizes the mean demographic characteristics for the analysed groups while Table 2 summarizes the mean qualitative test scores (Physical Activity Level - PACES – Motor Self Efficacy).

Table 3 summarizes correlations for BMI and qualitative instruments scores.

Table 1. Means and standard deviations of demographic variables

		Age		Height		Weight		BMI	
	N	Mean	SD	Mean	SD	Mean	SD	Mean	SD
All	177	15.49	0.9	1.69	0.1	64.51	12.9	22.44	3.7
Males	85	15.41	1.0	1.76	0.1	70.30	13.3	22.74	3.8
Females	92	15.55	0.9	1.63	0.1	59.16	10.0	22.17	3.6
Normal weight									
All	121	15.56	0.9	1.68	0.1	58.02	7.3	20.43	1.9
Males	54	15.46	0.9	1.74	0.1	62.07	7.4	20.43	1.9
Females	67	15.64	0.9	1.64	0.1	54.75	5.9	20.43	1.9
Overweight									
All	56	15.32	1.0	1.71	0.1	78.53	11.1	26.79	2.8
Males	31	15.32	1.1	1.78	0.1	84.62	8.5	26.75	2.9
Females	25	15.32	0.9	1.62	0.1	70.97	9.1	26.84	2.6

Table 2. Means and standard deviations of PAL – PACES - MSE scores

		LAF		PACES		MSE	
	N	Mean	SD	Mean	SD	Mean	SD
All	160	2.36	0.59	29.89	4.93	16.16	3.76
Males	68	2.53	0.57	31.20	4.60	17.67	3.31
Females	87	2.20	0.57	28.67	4.94	14.77	3.62
Normal weight							
All	113	2.39	0.61	30.57	4.99	16.52	3.82
Males	50	2.60	0.54	31.81	4.40	18.37	3.05
Females	63	2.23	0.61	29.57	5.24	15.03	3.74
Overweight							
All	34	2.28	0.56	28.41	4.50	15.39	3.52
Males	14	2.41	0.61	30.13	4.81	16.45	3.43
Females	20	2.13	0.45	26.28	2.98	14.08	3.24

Table 3. Spearman ranks correlation analysis BMI / PAL – PACES - MSE scores

BMI		**LAF**	**PACES**	**MSE**
All	177	-0.03	-0.15	-0.09
Males	85	-0.14	-0.13	-0.22
Females	92	0.05	-0.21	0.00
Normal weight				
All	121	0.12	0.13	0.14
Males	54	0.11	0.11	0.15
Females	67	0.17	0.17	0.23
Overweight				
All	56	-0.07	0.10	-0.10
Males	31	-0.34	0.01	-0.33
Females	25	0.20	0.48	0.47

CONCLUSION

A negative correlation was identified between the BMI and the values of the three scales for all subjects (rs = -0.03; -0.15; -0.09; respectively for PAQ_C, PACES and SEM). This correlation becomes more evident considering only overweight males.

Based on the analysis of the collected data, adolescents with a high BMI have a high probability of developing adverse perceptions of their effectiveness and facing a high risk of sedentary behaviours.

Furthermore, the results suggest that perceived self-efficacy and enjoyment are related to BMI and motor development. More precisely, perceived self-efficacy and enjoyment are factors of mediation to promote motor activities.

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