Appetite 96 (2016) 47–55

Contents lists available at ScienceDirect

Appetite

journal homepage: www.elsevier.com/locate/appet

It doesn't matter what they say, it matters how they behave: Parental influences and changes in body mass among overweight and obese adolescents

Karolina Zarychta [a, *], Barbara Mullan [b], Aleksandra Luszczynska [a, c, **]

[a] University of Social Sciences and Humanities, 30b Ostrowskiego Street, PL-53-238 Wroclaw, Poland
[b] Health Psychology & Behavioural Medicine Research Group, School of Psychology and Speech Pathology, Faculty of Health Sciences Curtin University, Kent Street, Bentley, WA 6102, Australia
[c] University of Colorado at Colorado Springs, 1420 Austin Bluffs Pkwy, Colorado Springs, CO 80933-7105, USA

ARTICLE INFO

Article history:
Received 6 March 2015
Received in revised form
15 August 2015
Accepted 29 August 2015
Available online 2 September 2015

Keywords:
Diet
Physical activity
BMI
Adolescence
Parents
Social influence

ABSTRACT

Objective: This study investigated whether the relationships between perceived parental behaviors (dietary behaviors, physical activity, and verbal pressure) and changes in adolescents' body mass index (BMI) were mediated by adolescents' physical activity and dietary behaviors. The associations were tested among overweight and obese adolescents.
Design: Longitudinal data were collected three times, with a 2-month interval between Time 1 (T1) and Time 2 (T2), and a 13-month interval between T2 and Time 3 (T3) in the group of adolescents ($N = 100$) aged 13–19. There was no experimental manipulation. Mediation analyses with two sequential mediators were conducted.
Main measures: Participants completed the questionnaires assessing their dietary behaviors, physical activity (mediators), perceived parental behaviors, and verbal pressure (independent variables). Adolescents' weight and height were measured objectively (with BMI constituting the outcome variable).
Results: Adolescents who perceived that their parents engaged in a healthy diet and frequent physical activity (T1) self-reported a healthier diet (T2 and T3), higher levels of physical activity (T2 and T3), and their combined index of healthy lifestyle was higher (T2 and T3). In turn, adolescents' behaviors (T2 and T3) were related to lower BMI (T3). Perceived behaviors of parents had a significant, indirect effect on a BMI reduction. There were no effects of the perceived parental verbal pressure (T1) through adolescents' behaviors (T2) on adolescents' BMI (T3).
Conclusion: Perceived parental modeling of healthy diet and frequent physical activity, but not verbal pressure, predicted adolescents' behaviors (diet, physical activity, and a combined lifestyle index) and, in turn, a reduction in their BMI. The role of parents' health behaviors (diet and physical activity) should be taken into account when considering adolescents' overweight and obesity prevention and treatment programs.

1. Introduction

In the last 30 years obesity has doubled in adolescents and quadrupled in children (National Center for Health Statistics, 2013). Reports from the Health Behaviour School-aged Children survey (HBSC, 2010) showed that 13.4%–21.7% of preadolescents and adolescents are overweight or obese (applying the International Obesity Task Force threshold for excessive weight; Cole, Bellizzi, Flegal, & Dietz, 2000). Even though this increase in obesity prevalence in Europe has slowed slightly within the last decade, it still remains high and continues to increase (Ogden, Carroll, Kit, & Flegal, 2014). Increases in BMI are significantly associated with unhealthy diet and physical inactivity (Piernas & Popkin, 2010; Spink, Wilson, & Ulvick, 2012). According to the World Health Organization (WHO, 2011) adolescents should perform at least 60 min

* Corresponding author.
** Corresponding author. Trauma, Health, and Hazards Center, University of Colorado at Colorado Springs, 1861 Austin Bluffs Pkwy, Colorado Springs, CO 80918, USA.
E-mail addresses: kzarychta1@swps.edu.pl (K. Zarychta), aluszczy@uccs.edu (A. Luszczynska).

http://dx.doi.org/10.1016/j.appet.2015.08.040
0195-6663/

of moderate to vigorous physical activity daily and eat at least four healthy meals a day (including fresh fruit and vegetables) to maintain optimal body weight (WHO, 2012).

Theories explaining maintenance of health behaviors, such as social cognitive theory (Bandura, 1997), emphasize the role of the perceptions of social environment (e.g., schools, home, and neighborhoods; Luszczynska et al., 2013). Social environmental variables may be directly related to health behaviors (Kremers et al., 2006) and are highlighted in the relational developmental system theories as playing a crucial role in determining adolescents' own behaviors (Bronfenbrenner & Morris, 2006).

Research on variables affecting the formation and maintenance of overweight and obesity in adolescence confirmed that the key social environmental factors are modeling through observation of the health behaviors (e.g. dietary and physical activity behaviors) of significant others (Erkelenz, Kobel, Kettner, Drenowatz, Steinacker, & the Research Group "Join the Healthy Boat—Primary School", 2014; Ullrich-French & Smith, 2009; Young, Fors, Fasha, & Hayes, 2004), external pressure to engage in healthy eating and maintain a low body weight (Cislak, Safron, Pratt, Gaspar, & Luszczynska, 2012; Rodgers & Chabrol, 2009), and prevalence of overweight and obesity in significant others (Burke, Beilin, & Dunbar, 2001; Krahnstoever Davidson, Francis, & Birch, 2005). It has been shown that parents may influence adolescents' health behaviors by being models of desired behaviors or by exerting verbal pressure to emphasize their own attitudes toward adolescents' health behaviors (Rodgers & Chabrol, 2009). Complex indices of parental health-promoting behaviors were shown to be associated with health behaviors of adolescents (Rew, Arheart, Thompson, & Johnson, 2013). Further, overweight risk in adolescents could be predicted from a combined index of parental self-reports of unhealthy diet and low levels of physical activity (Ihmels, Welk, Eisenmann, Nusser, & Myers, 2009).

The impact of parents' dietary or physical activity behaviors on adolescents' behaviors may be positive or negative. Parental modeling, both self-reported by parents and perceived by adolescents, has been found to be a significant predictor of adolescents' higher fruit and vegetables consumption (Berge, Meyer, MacLehose, Eisenberg, & Neumark-Sztainer, 2014; Young et al., 2004), more frequent physical activity (Erkelenz et al., 2014; Krahnstoever Davidson & Deane, 2010; Ullrich-French & Smith, 2009), and compliance with dietary guidelines (Cislak et al., 2012). However, some parental behaviors such as verbal pressure self-reported by parents or parental verbal pressure perceived by adolescents were related to preoccupation with thoughts about eating and overvaluation of body shape and weight among adolescents (Levine, Smolak, & Hayden, 1994; Rodgers & Chabrol, 2009). Therefore, forms of parental verbal pressure are considered to be the core mechanisms for the formation and maintenance of eating disorders (Cooper & Fairburn, 2011). Parental verbal pressure includes restricting certain kinds of foods, criticizing or sending verbal messages toward adolescents to lose weight, exercise more often, eat less or eat more fruit and vegetables (Scaglioni, Salvioni, & Galimberti, 2008). So far, no research has examined whether changes in overweight/obese adolescents' behaviors, evoked by the parental social influence variables (such as modeling and verbal pressure), may translate into changes in objective indicators such as BMI.

As a result of the extensive changes that occur throughout adolescence parental social influence decreases and the influence of peers and media increases (Steinberg & Sheffield Morris, 2001). Nonetheless, parental social influence on adolescents' health behaviors remains significant (Rodgers & Chabrol, 2009) but it operates indirectly rather than directly (Luszczynska et al., 2013; Steinberg & Sheffield Morris, 2001). During adolescence parents can still be considered to be one of the main targets for identification and a significant model for health behaviors (Rodgers & Chabrol, 2009). That is why exploring adolescents' perceptions of parental social influence variables (such as modeling and verbal pressure) might be of key importance in determining main predictors of diet and physical activity of young people. To our knowledge, these associations has not been studied in an isolated overweight or obese sample of adolescents.

In general, evidence from research conducted among adolescents suggests that various types of parental influence can decline in their predictive power during adolescence (Rodgers & Chabrol, 2009; Steinberg & Sheffield Morris, 2001). However, it is plausible that some sorts of parental influence would decrease more than other forms. Due to reactance (Johnson & Buboltz, 2000) parental pressure might be perceived by adolescents as a threat to their freedom, thus they may rather do what they observe than do what their parents tell them to do (Steinberg & Sheffield Morris, 2001). In line with this assumption, we hypothesize that among adolescents the effects of the parental verbal pressure will decrease more than the effects of the parental modeling over time.

There is no sufficient or unequivocal empirical evidence which clarifies the association between adolescents' perceptions of parental modeling or verbal pressure, health behaviors among overweight or obese adolescents, and their BMI. The existing evidence provides some insight into the predictors of BMI in general adolescent populations, which include adolescents with normal body weight and those with overweight and obesity. For example, Burke et al. (2001) found that objectively measured BMI of adolescents (aged 9–18) was significantly predicted by parents' self-reported health behaviors and parental BMI. Similarly, Berge, Wall, Bauer, and Neumark-Sztainer (2010) found that adolescent boys who did not perceive both parents as models of healthy diet and physical activity had higher BMI. Higher BMI of adolescent girls was related to perceived lack of encouragement and modeling healthy diet and physical activity by fathers. On the other hand, Williams and Mummery (2012), in their cross-sectional study, found no relationship between adolescents' BMI and parents' self-reported BMI or parents' self-reported health behaviors. While the evidence for the relations between the parental behaviors and objectively measured BMI is sparse, even less is known about whether these relationships are relevant among adolescents with excessive weight (overweight and obese).

1.1. Hypotheses

The present study investigated the associations between the perceived parental behaviors (diet and physical activity), perceived parental verbal pressure, and BMI of overweight or obese adolescents, in the context of the potential mediators and their indirect effects within these associations. The mediators included adolescents' dietary behaviors, physical activity, and a combined healthy lifestyle index (accounting for both physical activity and dietary behaviors). First, it was hypothesized that perceived parental health behaviors (Time 1; T1) would be associated with adolescents' BMI measured at long-term follow-ups (Time 3; T3), with adolescents' dietary behaviors (Time 2 [T2] and T3), physical activity (T2 and T3), and a healthy lifestyle index (T2 and T3) mediating the relationships. Second, we tested the association between the perceived parental verbal pressure (T1) and adolescent's BMI (T3), mediated by adolescents' dietary behaviors (T2 and T3), physical activity (T2 and T3) and a healthy lifestyle index (T2 and T3). Thus, we investigated if the perceived parental behaviors and perceived parental verbal pressure would explain adolescents' behaviors measured at short-term (2 months) and long-term (13 months) follow-ups. Changes in weight-related behaviors which