Journal of Adolescence 37 (2014) 85–96

Contents lists available at ScienceDirect

Journal of Adolescence

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

The effects of out-of-school time on changes in youth risk of obesity across the adolescent years

Nicole Zarrett [a,*], Bethany A. Bell [b]

[a] Department of Psychology, University of South Carolina, 1512 Pendleton Street, Columbia, SC 29208, USA
[b] College of Education, University of South Carolina, 133 Wardlaw College, Columbia, SC 29208, USA

Keywords:
Obesity
Adolescence
Out-of-school time
Afterschool programs
Health trajectories
Prevention

A B S T R A C T

This study examined the longitudinal effects of out-of-school time (OST) activities on youth weight-status through mid-to-late adolescence. First, using pattern-centered methods, we identified the prominent ways in which youth allocate their OST across 12 common active and sedentary activities available to them. Second, through multi-level modeling procedures we examined the relation of OST activity patterns to: 1) BMI-status during the 11th grade, and; 2) within-person change in BMI-status across the adolescent years. After accounting for race, gender, SES, pubertal-status, and gaming, youth who participated in a sports-dominant activity pattern for 2 or more years had significantly lower 11th grade odds of being at-risk for overweight/obesity compared to youth in all other activity patterns. Youth of all other activity patterns had similar odds of being at-risk as Low-Activity youth and each other. Understanding the relations of OST to youth healthy weight is a critical first step in developing healthy OST settings.

Recognized as the primary health threat for young people, recent reports indicate that a national high of 34.2% of youth (39.5% of African American adolescents) are now considered at-risk for overweight or obesity (Ogden, Carroll, Curtin, Lamb, & Flegal, 2010). A number of effective school-based programs aimed at increasing youth physical activity and healthy eating have been implemented in the past two decades to address the obesity epidemic, however, many of these programs now face challenges due to reductions of physical education offered in U.S. public schools. Consequently, researchers have begun to look towards organized youth programs offered during adolescents' out-of-school time (OST) as another ideal setting for promoting youth physical activity and healthy eating. Along with sports, which are inherently 'active', other organized afterschool programs (ASPs; e.g., community clubs), which often feature physical recreation as one part of the 'curriculum,' represent a relatively healthy environment compared to alternative OST arrangements (e.g., home alone) which typically include excessive time spent in sedentary activities (watching television) and extended opportunities for snacking (Frank, Andresen, & Schmid, 2004; Robinson, 2001). Therefore, over time, youth who regularly participate in ASPs are expected to engage in more physical activity and healthy eating, and less sedentary behaviors, leading to lower rates of obesity than youth who do not participate.

Although there is considerable research on the effects of targeted afterschool interventions on BMI (Beets, Beighle, Erwin, & Huberty, 2009), little-to-no research has looked at the link between youth participation in the common OST programs

Abbreviations: OST, Out-of-school time; ASP, Afterschool programs.

* Corresponding author. Tel.: +1 803 777 2970; fax: +1 803 777 9558.
E-mail addresses: zarrettn@mailbox.sc.edu (N. Zarrett), bellb@mailbox.sc.edu (B.A. Bell).

0140-1971/$ – see front matter © 2013 The Foundation for Professionals in Services for Adolescents. Published by Elsevier Ltd. All rights reserved.
http://dx.doi.org/10.1016/j.adolescence.2013.11.001

offered in their schools and communities and BMI status across the adolescent years. The present study begins to address this gap in research through an examination of how youth spend their OST across multiple active and sedentary activities available to them during the 7th, 8th, and 11th grades, and its relation to youth BMI trajectories across these critical adolescent years.

OST for promoting physical activity, healthy eating, and healthy weight

Physical activity declines as much as 50% through the middle and high school years, and 50–92% of youth fail to meet the national guidelines of 60 min of daily activity (Nader, Bradley, Houts, McRitchie, & O'Brian, 2008; USDHHS, 2008). Energy intake from food consumption, without ample energy expenditure results in adolescents' increased risk for overweight/obesity. Establishing and maintaining healthy weight becomes increasingly difficult once an individual becomes obese with approximately 50% of obese youth becoming obese adults (Dietz, 1998a, 1998b). For these reasons the adolescent years have been identified as a critical period in the development of obesity and a particularly important time to engage individuals in healthy settings.

Within the United States, 8.4 million youth participate in ASPs for an average 8.1 h/week of their OST (Afterschool Alliance, 2009). ASPs are believed to promote health through providing youth ample physical activity opportunities and limiting their access to sugar-sweetened beverages, energy-dense convenience foods, and screen time. However, despite the proposed benefits of ASPs, previous research has reported mixed findings on the associations between ASP participation and healthy behaviors. In a series of studies involving economically and ethnically diverse samples, Vandell and Shumow (1999) found youth enrolled in ASPs spent more time engaged in physical activity, and less time watching TV and eating snacks than non-participating youth. Similarly, using systematic observation of 7 community-based ASPs (e.g., Boys/Girls Clubs), Coleman, Geller, Rosenkranz, and Dzewaltowski (2008) found children (4th graders) were spending approximately 47 min of the program time in active recreation. In contrast, other studies using similar observational methods found the amount of activity youth accumulate within ASPs is well below policy-recommended levels (Beets, Huberty, & Beighle, 2012; Trost, Rosenkranz, & Dzewaltowski, 2008) and the majority of snacks served within programs fail to meet existing nutritional standards (Beets, Tilley, Kim, & Webster, 2011; Coleman et al., 2008).

Other studies have suggested that even organized sports fail to meet suggested guidelines for physical activity (Leek et al., 2010), and therefore, contribute little to the prevention of obesity. Specifically, where some research has shown youth engage in more moderate-to-vigorous physical activity on participation days than non-sports days (Wickel & Eisenmann, 2007), other research has shown youth spend 43% of sports practice inactive and fewer than one-fourth of youth obtain the recommended 60 min of moderate-to-vigorous activity during practice (Katzmarzyk, Walker, & Malina, 2001). Studies on the influence of sports on youth BMI is also characterized by a lack of consistent evidence with results ranging from sports having a positive influence (Elkins, Cohen, Koralewicz, & Taylor, 2004; Romani, 2011; Santos, Oliveira, Ribeiro, & Mota, 2009), to having no effect (Nowicka, Lanke, Pietrobelli, Apitzsch, & Flodmark, 2009; Zahner et al., 2008), or even a negative influence on weight-status (Elkins et al., 2004; Gazzaniga & Burns, 1993). However, the majority of these studies were cross-sectional, use a dichotomous measure of participation, and do not consider participation in sports relative to the other active and inactive OST activities in which they participate. Such methodological limitations may be the reason for the mixed effects found for sports (Romani, 2011).

To date, only a single study has examined the relation of non-sports OST programs on youth BMI, showing children (ages 7–9) who regularly participate in ASPs had less increase in BMI than nonparticipants (Mahoney, Lord & Carryl, 2005). However, the age of the sample prevents us from drawing conclusions of whether relations between participation and obesity are similar during adolescence. Moreover, given previous studies have focused solely on single activity types, we know little about the relative impact of each activity on youth weight-status compared to other activity options available to youth (e.g., health benefits of sports vs. community clubs). The type of OST activity, frequency and duration (cross-year continuity) of participation, and time spent in the activity relative to time spent in other active and sedentary activities, all likely matter in whether youth participation influences BMI trajectories through middle-to-late adolescence (Zarrett et al., 2009). The present study will begin to address this gap in research through using a pattern-centered approach to examine how adolescents allocate their OST across multiple active and sedentary activities available to them and its relation to youth BMI across the adolescent years.

Adolescents' OST activity patterns

Recently, researchers have begun to demonstrate the importance of considering the unique combinations or patterns of individual's co-occurring health behaviors and associated health outcomes as a more accurate account of a healthful lifestyle and more effective target for intervention than focusing on singular activities/behaviors to promote health (Nelson, Gordon-Larsen, Adair, & Popkin, 2005). Researchers using this technique have found physical activity does not necessarily replace time otherwise spent sedentary but rather, individuals may participate in both sedentary and active behaviors with high frequency (Feldman, Barnett, Shrier, Rossignol, & Abenhaim, 2003). In turn, frequent sedentary behavior is often not predictive of obesity risk when these behaviors are coupled with frequent activity.

Youth allocate their OST across multiple organized and unorganized activities available to them that fall within these similar patterns of active and sedentary behaviors, and which have the same implications for their physical health. For instance, frequent sports participation may be linked to healthy weight even when coupled with frequent sedentary behavior, but found ineffective for promoting youth health if participation is consistently less frequent than youth sedentary behaviors. Likewise, minimal