Personal, behavioral, and environmental predictors of healthy weight maintenance during the transition to adulthood

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ABSTRACT

There is a high prevalence of overweight among U.S. young adults and the intergenerational implications of excess weight gain at this life stage are great. We used Project EAT (Eating and Activity in Teens and Young Adults) study data to identify personal, behavioral, and environmental factors that predicted healthy weight maintenance during the transition from adolescence to adulthood and as individuals progressed from the third to fourth decade of life. The sample included 1120 young adults who were secondary school students in Minneapolis-St. Paul at Time 1 (1998–1999) and responded at follow-ups in 2008–2009 and 2015–2016. Results showed individual factors and multiple environmental factors contribute to maintenance. The most consistent findings suggest that having higher body satisfaction and avoiding unhealthy weight control behaviors (e.g., skipping meals) and dieting are protective against excess weight gain for women and men. For example, the odds ratio associated with a one standard deviation increase in the probability of using an extreme weight control behavior from adolescence and adulthood was 0.67 (CI: 0.54, 0.84) among women and 0.34 (CI: 0.12, 0.96) among men indicating decreased odds of maintaining a healthy weight. Social support for healthy eating and physical activity were protective whereas close relationships with individuals who were dieting (e.g., parents, significant others) reduced the likelihood of maintaining a healthy weight. Primary prevention strategies should continue beyond adolescence and involve peer social support to encourage young people at a healthy weight to be satisfied with their shape/size and avoid restrictive weight control behaviors.

1. Introduction

Young adulthood is a high-risk period for undesired weight gain and transitioning to a potentially unhealthy body mass index (BMI) (Gordon-Larsen et al., 2010; Kimokoti et al., 2013). Although some individuals with a BMI at or above 25 kg/m^2 are metabolically healthy, there are a number of associated health risks as BMI increases above this defined value. Being at an unhealthy BMI and, in particular the presence of obesity (BMI ≥ 30 kg/m^2), during young adulthood may negatively impact reproductive outcomes as well as long-term risk for type 2 diabetes and cardiovascular disease (Adane et al., 2017; Attard et al., 2013; Cheng et al., 2016; Lloyd-Jones et al., 2007; Nodine and Hastings-Tolsma, 2012; Truesdale et al., 2006). Limiting excess weight

gain and supporting healthy weight maintenance are important population-level health targets for young adults (Buscemi et al., 2017).

Additional research addressing the complex influences on young adults' weight-related behaviors is needed to strengthen multi-contextual weight gain prevention strategies. Few developmentally-tailored interventions for young adults have demonstrated effectiveness (Cheng et al., 2016; Laska et al., 2012) and most existing studies addressing influences on weight maintenance focus on what is needed to prevent weight regain after weight loss versus the potentially different supports needed for ongoing maintenance of a healthy weight (Annesi and Mareno, 2017; Harris et al., 1994; Kraschnewski et al., 2010; Kruger et al., 2008; Nikolaou et al., 2015; Turk et al., 2012; Weiss et al., 2007; Wing and Hill, 2001; Wing and Phelan, 2005). Given that many
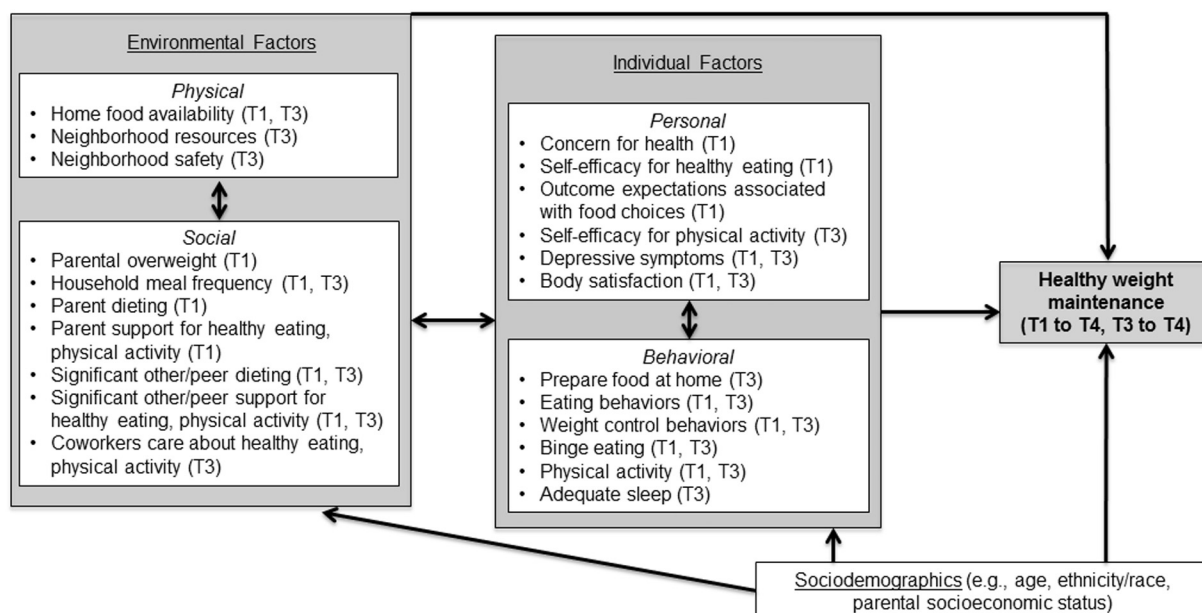

Fig. 1. Theoretical framework for identifying personal, behavioral, and environmental influences on healthy weight maintenance from adolescence to adulthood. Data was available to examine the relevance of a predictive factor as assessed at Time 1 in adolescence (T1), Time 3 in early adulthood (T3), or both life stages. Associations of change over time in predictive factors from T1 or T3 to Time 4 in adulthood (T4) with the likelihood of healthy weight maintenance to T4 were also examined when possible. Factors included in the framework were selected based on alignment with constructs of social cognitive theory (personal factors, behavioral factors) and a broader ecological framework (physical and social environmental factors); however, not all major constructs of these models could be represented by the Project EAT data. The double-sided arrows within the figure are intended to reflect reciprocal determinism and the dynamic interactions between individuals (personal factors), their behaviors, and their environments.

environmental characteristics have the potential to influence weight maintenance, the development of more effective primary prevention guidelines will require consideration of multiple contexts.

The current study extends the evidence base and aligns with calls for research to inform prevention efforts by focusing on the identification of potentially modifiable personal, behavioral, and environmental factors that predict healthy weight maintenance during the transition from adolescence to adulthood, and factors specifically of relevance during the understudied transition from the third to fourth decade of life (National Institutes of Health, 2015; National Institutes of Health Obesity Research Task Force, 2011; Story et al., 2008). As few longitudinal studies of weight-related health extend from adolescence to beyond the third decade (Larson et al., 2011b; Winpenny et al., 2017), this study used data collected over more than fifteen years of follow up and examined early adulthood separately as a unique stage. Also, based on prior research that has identified sex-specific correlates of weight status (Arabshahi et al., 2017; Morgan et al., 2012; Quick et al., 2013), this study separately examined associations among women and men.

Social cognitive theory (SCT) and an ecological framework were used in combination to guide the study (Fig. 1) given their complementary strengths; the depth of SCT is useful for illuminating individual-level (personal and behavioral) factors and the breadth of an ecological framework aids in illuminating environmental (physical and social) factors that determine weight-related outcomes in multiple contexts (Kelder et al., 2015; Sallis and Owen, 2015). Further, the attention to dynamic interactions between individuals and their environments as central constructs of both models (i.e., reciprocal determinism) is useful for guiding the interpretation of results and their translation to comprehensive interventions (Kelder et al., 2015; Sallis and Owen, 2015). The potential predictors shown in Fig. 1 were included based on their relevance to the guiding health behavior models, the existing literature that more broadly addresses correlates of weight status, and the availability of representative measures within the longitudinal data that were used for the current study (Bandura, 1986; Haines et al., 2007; Kelder et al., 2015; Neumark-Sztainer et al., 2007; Quick et al., 2013; Sallis and Owen, 2015).

2. Methods

2.1. Study design and population

Data were drawn from the population-based, Project EAT (Eating and Activity in Teens and Young Adults) longitudinal study of weight-related health. A total of 1664 young adults responded at each of the three time points included in the current analysis. For the original assessment (Time 1) in 1998–1999, 4746 adolescents enrolled at 31 public secondary schools in Minneapolis-St. Paul, Minnesota completed surveys and had their height and weight measured in school classrooms (Neumark-Sztainer et al., 2002a; Neumark-Sztainer et al., 2002b). A follow-up assessment was conducted online and by mail in 2008–2009 (Time 3) as participants progressed through adolescence and emerging adulthood (Larson et al., 2011a; Neumark-Sztainer et al., 2006b; Neumark-Sztainer et al., 2011). The Time 4 assessment was designed to follow up again in 2015–2016 as participants progressed through young adulthood and entered their fourth decade of life (mean age of 31.0 ± 1.6 years).

Invitations to complete the Time 4 online or paper survey were mailed to all original participants who had responded to at least one previous follow-up assessment; however, given the focus on adulthood and prior findings that few young people returned to a healthy weight if they were overweight at a young age (Goldschmidt et al., 2018), Time 2 (2003–2004) data were not included. Time 4 data collection yielded a response from 66.1% of the 2770 original participants who could be contacted. The University of Minnesota's Institutional Review Board Human Subjects Committee approved all protocols and participants provided informed consent.

2.2. Survey measures

2.2.1. Personal, behavioral, and environmental factors

For each factor in the analysis and shown in Fig. 1, Table 1 provides the survey item wording, available psychometric properties, and a