Published in final edited form as:
Women Health. 2012 ; 52(6): 606–619. doi:10.1080/03630242.2012.705243.

Mental Health and Family Functioning as Determinants of A Sedentary Lifestyle among Low-Income Women with Young Children

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Abstract

This cross-sectional study examined mental health and family environmental factors related to a sedentary lifestyle, including lack of leisure-time physical activity (LTPA) and high levels of television viewing, among low-income mothers/female guardians of preschool-aged children. A self-administered questionnaire was completed by 131 mothers in 2010. Primary outcome measures included television viewing time (minutes/day) and LTPA (< 150 versus ≥150 minutes per week). Independent variables included depressive symptoms, perceived stress and family functioning. Demographic factors (age, marriage, work status, education, number of children in the household and race/ethnicity) were examined as potential covariates. Participating women watched TV on average 186.1 minutes/day (i.e., >3 hours). Additionally, 36% of women engaged in less than the recommended 150-minute LTPA per week. Hierarchical multiple regression analyses indicated that greater depressive symptoms (B = 76.4, p<.01) and lower family functioning (B = 33.0, $p < .05$) were independently related to greater television viewing when controlling for other variables. No independent factors were identified for lack of LTPA when controlling for other covariates. Findings suggest that health promotion efforts to promote an active lifestyle among low-income women with young children should address mental health and family functioning factors, especially depressive symptoms.

INTRODUCTION

A sedentary lifestyle, engaging in low levels of physical activity and a greater number of television viewing hours, may result in deleterious health outcomes, such as obesity (Jeffery & French, 1998; Vanhecke, et al., 2009) and cardiovascular diseases (Proper, Singh, van Mechelen, & Chinapaw, 2011; Wijndaele, et al., 2010). Low-income women (Crawford, Jeffery, & French, 1999; King, et al., 2010) and women with children (Fahrenwald, Atwood, Walker, Johnson, & Berg, 2004) tend to be more sedentary than higher income women and/or women without children, and thus at greater risk for related adverse health consequences. Frequently reported barrier to engaging in regular physical activity has included a lack of time due to family commitments (Ball, Salmon, Giles-Corti, & Crawford, 2006). As a disproportionate number of low-income mothers are single parents (Brown & Moran, 1997; Langlois & Fortin, 1994), bearing primary responsibility for childrearing (Holden & Smock, 1991), they may have little time for physical activity. Consistent with these findings, women living alone (i.e., without children or a domestic partner) have reported exercising more than

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those living in multiple-member households (Bae, et al., 2007). Therefore, low-income mothers/female guardians (abbreviated as mothers below) may be particularly vulnerable to the risks of a sedentary lifestyle (Fahrenwald, et al., 2004), which primarily includes low levels of physical activity and a greater number of television viewing hours.

A growing body of evidence suggests that sedentary lifestyles are related to mental health disorders and/or dysfunctional family environment among women, especially in low income women. Low-income mothers report higher levels of depressive symptoms and greater stress than their higher income counterparts (Cairney, Boyle, Offord, & Racine, 2003; Fahrenwald, et al., 2004; Hall, Williams, & Greenberg, 1985). In turn, higher perceived stress (Anderson, Collins, Schmitt, & Jacobvitz, 1996) and depressive symptoms (Richmond, Walls, Gooding, & Field, 2010; Teychenne, Ball, & Salmon, 2010) have been associated with a more sedentary lifestyle in women, particularly women from disadvantaged backgrounds (Chang, Nitzke, Guilford, Adair, & Hazard, 2008).

As a result of the tremendous stress associated with living at or near poverty, low income families have also been reported to be at increased risk of poor family functioning (Sarmiento & Cardemil, 2009). Family functioning has been related to maternal obesity risk behaviors, such as sedentary behavior among pregnant women (Wen, Simpson, Baur, Rissel, & Flood, 2011), and may be related to sedentary lifestyle behaviors in low income mothers as well (Davison & Birch, 2001; Eyler & Vest, 2002; Sanderson, Littleton, & Pulley, 2002), but little is known about whether family functioning is related to sedentary lifestyles specifically among this population. Moreover, poor family functioning has been linked with higher perceived stress and depressive symptoms (Sarmiento & Cardemil, 2009), suggesting that these three risk factors for sedentary lifestyle may overlap in a social ecological perspective (Sallis & Owen, 2002).

While sedentary lifestyle behaviors among low-income mothers may be explained by their mental health status and family environmental factors, few studies have examined these relationships concurrently. In addition, although associations have been reported between demographic characteristics (such as race/ethnicity and age) and physical inactivity (Wilbur, Michaels Miller, Chandler, & McDevitt, 2003), and between body weight and sedentary lifestyle (Sugiyama, Healy, Dunstan, Salmon, & Owen, 2008) in women, little is known about these links specifically among low-income mothers. Results from this study will help determine if programs promoting active lifestyles in low income mothers need to address all or a subset of these risk factors..

METHODS

Participants

Parents were part of a family-centered children obesity intervention study for low-income families. Mothers were eligible if they had at least one child in Head Start who was between the ages of 2 and 5 years during the 2010–2011 academic year. Eligible parents were recruited through five Head Start centers in Rensselaer County, New York between October and November 2010. Research staff and community partners directly recruited parents as they picked their children up from daycare, and recruitment letters were sent home in children’s backpacks. Parents interested in participating signed informed consent forms, provided contact information, and received the survey to return to the Head Start centers in their children’s backpacks or by dropping it off to Head Start staff. All of the children and their parents at the five Head Start centers were exposed to some parts of the intervention because it was an environmental intervention. In the 2010–2011 academic year, 546 children were enrolled in the five Head Start centers, and 423 of them were between the ages of 2 and 5 years; so, the eligibility rate was 77%. Of the 423 eligible children, 154 (36%) of their

parents were recruited at baseline for the intervention and completed a self-report questionnaire. Mothers' data (N = 131) were used for the current analyses as a cross-sectional study. The Institutional Review Board at the University at Albany (SUNY) approved the study procedures.

Measures

Demographic variables and body weight status—Mothers self-reported their race/ethnicity, age, education, marital status, work status, and the number of children in household. They also reported their height and weight, which were used to calculate their Body Mass Index (BMI in kg/m^2) and weight status [obese (body mass index, BMI≥ 30) versus non-obese (BMI<30)] (NHLBI Obesity Education Initiative Expert Panel, 1998).

TV viewing time—Mothers reported the time (hours and minutes) they spent watching TV, DVDs or video on a typical week day and a typical weekend day using standard questions (U.S. Department of Agriculture, 2012). Average daily minutes of TV watching on were computed by summing weekday minutes × 5 and weekend minutes × 2 and dividing the total of these minutes by 7. High TV viewing was used to indicate a high level of sedentariness.

Lack of Leisure-time physical activity (LTPA)—LTPA included activities that were NOT part of housework, job duties or transportation (Kandula & Lauderdale, 2005). Two questions derived from the validated short form of International Physical Activity Questionnaires (IPAQ) (The short-form IPAQ proved to reliable and valid: (1) Spearman correlation coefficients for test-retest reliability have been about 0.8 in diverse settings; (2) concurrent validity was affirmed by comparing short-form IPAQ with the validated long-form IPAQ within the same study and the pooled Spearman correlation coefficient (ρ) was 0.67 (95% CI 0.64–0.70); and (3) criterion validity was also affirmed with fair to moderate agreement between different forms of IPAQ and a validated and objective measure of physical activity using Computer Science Application accelerometer and the pooled ρ was 0.30 (95% CI 0.23–0.36).) (Craig, et al., 2003) were used to measure LTPA (Li, et al., 2010). The following questions were used : (1) "During the last 7 days, on how many days did you exercise, play a sport, or participate in VIGOROUS physical activity for at least 10 minutes at a time that made you breathe hard and sweat (such as running, fast bicycling, aerobics, or basketball games)?"; and (2) "During the last 7 days, on how many days did you exercise, play a sport, or participate in MODERATE physical activity for at least 10 minutes at a time that increased your heart rate and breathing increased slightly (such as fast walking, swimming for leisure, or shooting hoops)?" Total weekly LTPA minutes was computed by (minutes of moderate PA + minutes of vigorous PA × 2) (U.S. Department of Health and Human Services, 2008). Mothers were classified into two groups: 1 = <150 min LTPA/wk versus 0 = ≥150 min LTPA/wk (U.S. Department of Health and Human Services, 2008). Mothers who engaged in less than 150 min LTPA/wk were considered lacking adequate LTPA as another indicator of sedentary lifestyle.

Perceived stress—Mothers' perceived stress was measured using the 4-item validated Perceived Stress Scale (PSS) (e.g., "In the last month, how often have you felt that you were unable to control the important things in your life?" "In the last month, how often have you felt that things were going your way?") (Cohen, Kamarck, & Mermelstein, 1983). Response options ranged from 0=Never to 4= Very often. PSS scores were obtained by reversing the scores on 2 positive items and then calculating the average of the 4 items. In this study, acceptable internal reliability was identified (Cronbach's α= .75).

Depressive Symptoms—Mothers' depressive symptoms were measured using a brief nine-item validated Patient Health Questionnaire (PHQ-9) (e.g., "Over the last 2 weeks, how often have you been bothered by any of the following problems?") (Kroenke, Spitzer, & Williams, 2001). Response options range from 0=Not at all to 3=Nearly every day. The internal consistency coefficient in this study was Cronbach's $\alpha = .89$. PHQ-9 scores were obtained by summing across all nine items. Mothers were categorized as exhibiting moderate depressive symptoms (summed PHQ-9 scores ≥10) (N=22) versus no depressive symptoms (summed PHQ-9 scores <10) (N= 109).

Family functioning—Family functioning was measured using a validated 5-item scale (e.g., "We fought a lot in our family"; "Family members sometimes got so angry they threw things".). Response options range from 1=Very untrue to 3= Very true (Bloom, 1985). A family functioning score was calculated by reverse scoring two positive items and then calculating the average of the five items. The internal reliability was acceptable (Cronbach's $\alpha = .73$).

Data Analyses

Associations between demographic factors and the outcomes variables were examined using ANOVA for continuous outcome variables (maternal TV viewing) and chi-square analysis for categorized outcomes (maternal low LTPA) (Table 1); variables associated with the outcome variables at $p<.10$ were included as covariates in multivariable analyses. Bivariate associations between the independent variables (perceived stress, depression and family functioning) and the dependent variables (TV viewing and low LPTA) were examined using Pearson's correlation or chi-square test. Independent variables that displayed a significant (at $p = 0.10$) bivariate relationship with an outcome variable were collectively entered into a multivariable analysis along with relevant covariates (Hosmer & Lemeshow, 2000). Hierarchical multiple linear regression (maternal TV viewing as an outcome) and hierarchical logistic regression (maternal lack of LPTA as an outcome) were applied. The order of entry of variables into the regression models was as follows: (1) demographic variables and BMI; (2) perceived depressive symptoms; (3) perceived stress; and (4) family functioning, if statistically significant bivariate associations were identified at $p \leq .10$ (Hosmer & Lemeshow, 2000). Beyond demographic factors, variable entry order was based on the relative strength and consistency of the supporting literature. The Hosmer-Lemeshow test (Hosmer & Lemeshow, 2000) was used to determine the goodness-of-fit of each logistic regression model. Data were analyzed using the statistical program SPSS 19.

RESULTS

On average, mothers watched more than 3 hours of TV on a day, and about 40% of the mothers did not engage in 150-minute moderate LTPA per week (Table 1). No significant relationships ($p > .05$) were identified between maternal TV viewing time and lack of LTPA with mothers' race/ethnicity, age, marital status, or education. Marginal relations ($.05 < p \leq .10$), however, were identified for maternal BMI status and work status (for lack of LPTA) and the number of children in the household (for TV viewing); these variables were, therefore, included in the appropriate multivariable analyses as covariates. Bivariate analyses revealed that maternal TV viewing time was highly correlated with moderate depressive symptoms ($r = .38$, $p < .001$), perceived stress ($r = .29$, $p < .001$), and family functioning ($r = .28$, $p < .01$). Maternal lack of LTPA was highly correlated with perceived stress ($r = .25$, $p < .05$) and associated with moderate depressive symptoms ($\chi^2 = .38$, $p < .01$),

In multivariable modeling, depressive symptoms, perceived stress and family functioning were independently associated with greater television viewing in women (Table 2). Higher depressive symptoms, explained 12% of the variance in TV viewing beyond that explained by demographic covariates Model 1. In model 2, the addition of perceived stress to the model did not improve model fit. Finally, in model 3, family functioning explained a further 3% of the variance in TV viewing beyond that explained by depressive symptoms and perceived stress.

Depressive symptoms and perceived stress were independently associated with lack of LTPA (Table 3). In model 1, higher depressive symptoms was marginally significantly (p = 0.09) associated with lack of LTPA, and the model was substantially developed from the covariate-only model ($\Delta\chi^2 = 2.77$, $p = 0.09$). In model 2, the addition of perceived stress to the model did not improve model fit ($\Delta\chi^2 = 1.2$, $p = .28$). The results of Hosmer-Lemeshow test indicated good model fit of the logistic regression models ($p > .05$).

DISCUSSION

TV viewing and PA are regarded as separate forms of a sedentary lifestyle because they are related to different physical outcomes (Aadahl, Kjaer, & Jorgensen, 2007). Although lack of PA in any domain (i.e., leisure-time, domestic, work-related and transport-related PA) may contribute to a sedentary lifestyle, most of studies have focused on LTPA when the relationship between PA and mental health was examined (Sieverdes, et al., 2012; Teychenne, Ball, & Salmon, 2008a, 2008b). LTPA has been a stronger correlate than PA in other domains (Teychenne, et al., 2008b). In this study, different factors related to two important behaviors related to sedentary living, i.e., excessive TV viewing and lack of LTPA, were identified among low-income mothers. Results showed that: (1) higher depressive symptoms and lower family functioning were associated with prolonged television viewing among mothers; and (2) depressive symptoms were marginally associated with lack of LTPA after controlling for covariates, but this association disappeared when perceived stress was added to the model.

Many researchers have examined factors related to sedentary behaviors among young adult women (Richmond, et al., 2010), white women (Eyler & Vest, 2002), and in men versus women (Anderson, et al., 1996). Fahrenwald and colleagues implied that low-income mothers are at higher risk for sedentary living than other women (Fahrenwald, et al., 2004), but little known research has focused specifically on low-income women who are typically more sedentary than their higher income counterparts (King, et al., 2010; Yeager, Macera, & Merritt, 1993). Therefore, preliminary findings of the present study fill an important potential gap in the literature examining factors related to sedentary living for low-income young mothers.

These findings contribute to the literature on sedentary lifestyles in three important ways. First, they further enhance the current evidence that sedentary lifestyles are linked to mental health disorder in women (Cairney, et al., 2003; Fahrenwald, et al., 2004; Hall, et al., 1985). Second, they provide extended information on factors associated with sedentary lifestyle behaviors in low income mothers, which can be used to tailor interventions to their needs. Among the examined factors, maternal depressive symptoms stands out as a factor related to both TV viewing time and lack of LTPA. This pattern is consistent with prior research linking depressive symptoms with a number of unhealthy behaviors, such as physical inactivity (Allgower, Wardle, & Steptoe, 2001) and excessive TV viewing (Teychenne, et al., 2010) and suggest that depressive symptoms should be targeted in programs to reduce sedentary lifestyles in low-income mothers. Third, the significant link of family functioning with maternal TV viewing above and beyond mental health indicates that family

environmental factors (Davison & Birch, 2001; Eyler & Vest, 2002; Sanderson, et al., 2002) are additional critical intervention targets.

Perceived stress, however, was not associated with maternal TV viewing once depressive symptoms were taken into consideration. Given that stress was associated with maternal TV viewing in the univariate model, this implies that depressive symptoms may mediate the association between stress and TV viewing. While prior research supports a prospective longitudinal relationship between stress and depressive symptoms (Bromberger & Matthews, 1996), evidence of the triad between depressive symptoms, perceived stress and maternal TV viewing, is lacking for low-income mothers. A prospective study is needed to draw conclusions regarding the casual path between mental health factors and maternal TV viewing.

More clearly identified factors associated with TV viewing than lack of LTPA indicate that low-income women with children might be more susceptible to excessive TV viewing compared to less participation of regular physical activity when they encountered some difficult events in lives. The lack of a relationship between family functioning and LTPA was consistent with a previous study which indicated that family characteristics were highly predictive of women's physical activities of daily living but not physical activities in leisure time (Scharff, Homan, Kreuter, & Brennan, 1999).

This study had several limitations. First, the use of a cross-sectional design prohibited assessment of the temporal and causal relations between outcome variables and their correlates. Second, the relatively small sample of low-income women recruited from one geographic region may have provided insufficient statistical power to detect some meaningful associations. Third, the non-probability sampling technique and potential participation biases might limit the generalization of the findings of this study to other low-income mothers. Fourth, self-reported measures may potentially have led to response bias and the accuracy of the measures based on the IPAQ may have been compromised given the modest values for concurrent and criterion validity of the IPAQ.

The findings of this study have a number of implications for interventions aiming to reduce sedentary living behaviors among low-income mothers. First, this study highlights factors that may play an important role in predicting sedentary lifestyle behaviors in low-income mothers including mothers' mental health and family functioning. Second, this study affirmed the discrepancy in the factors related to TV viewing and lack of LTPA, which will help health practitioners to tailor programs to different purposes. Third, given that depressive symptoms were identified as strongly correlated with both forms of sedentary behavior, more attention should be given to improve and apply strategies to alleviate depressive symptoms among low-income mothers. However, to date no causal effects of correlates on low-income mothers' sedentary lifestyle have been conducted. More research is needed in this area, and findings of this study suggest that the factors identified in the study may be a fruitful area of future inquiry and intervention.

Acknowledgments

We would like to express our sincere gratitude to Karen Gordon, the Commission on Economic Opportunity for the Greater Capital Region, and the Head Start families they serve for their commitment to the project. This study was funded by the National Institute on Minority Health and Health Disparities (R24MD004865).

REFERENCES

Aadahl M, Kjaer M, Jorgensen T. Influence of time spent on TV viewing and vigorous intensity physical activity on cardiovascular biomarkers. The Inter 99 study. Eur J Cardiovasc Prev Rehabil. 2007; 14(5):660–665. [PubMed: 17925625]

Allgower A, Wardle J, Steptoe A. Depressive symptoms, social support, and personal health behaviors in young men and women. Health Psychol. 2001; 20(3):223–227. [PubMed: 11403220]

Anderson DR, Collins PA, Schmitt KL, Jacobvitz RS. Stressful life events and television viewing. Comm Res. 1996; 23(3):243–260.

Bae S, Urrutia-Rojas X, Patel D, Migala WM, Rivers PA, Singh KP. Comparison of health behaviors among single- and multiple-member households. Am J Health Behav. 2007; 31(5):514–525. [PubMed: 17555382]

Ball K, Salmon J, Giles-Corti B, Crawford D. How can socio-economic differences in physical activity among women be explained? A qualitative study. Women Health. 2006; 43(1):93–113. [PubMed: 17050487]

Bloom BL. A factor analysis of self-report measures of family functioning. Fam Process. 1985; 24(2): 225–239. [PubMed: 4018243]

Bromberger JT, Matthews KA. A longitudinal study of the effects of pessimism, trait anxiety, and life stress on depressive symptoms in middle-aged women. Psychol Aging. 1996; 11(2):207–213. [PubMed: 8795049]

Brown GW, Moran PM. Single mothers, poverty and depression. Psychol Med. 1997; 27(1):21–33. [PubMed: 9122302]

Cairney J, Boyle M, Offord DR, Racine Y. Stress, social support and depression in single and married mothers. Soc Psychiatr Psychiatr Epidemiol. 2003; 38(8):442–449.

Chang MW, Nitzke S, Guilford E, Adair CH, Hazard DL. Motivators and barriers to healthful eating and physical activity among low-income overweight and obese mothers. J Am Diet Assoc. 2008; 108(6):1023–1028. [PubMed: 18502238]

Cohen S, Kamarck T, Mermelstein R. A global measure of perceived stress. J Health Soc Behav. 1983; 24(4):385–396. [PubMed: 6668417]

Craig CL, Marshall AL, Sjostrom M, Bauman AE, Booth ML, Ainsworth BE, et al. International physical activity questionnaire: 12-country reliability and validity. Med Sci Sports Exerc. 2003; 35(8):1381–1395. [PubMed: 12900694]

Crawford DA, Jeffery RW, French SA. Television viewing, physical inactivity and obesity. Int J Obes Relat Metab Disord. 1999; 23(4):437–440. [PubMed: 10340824]

Davison KK, Birch LL. Childhood overweight: a contextual model and recommendations for future research. Obes Rev. 2001; 2(3):159–171. [PubMed: 12120101]

Eyler AA, Vest JR. Environmental and policy factors related to physical activity in rural white women. Women Health. 2002; 36(2):111–121. [PubMed: 12487144]

Fahrenwald NL, Atwood JR, Walker SN, Johnson DR, Berg K. A randomized pilot test of"Moms on the Move": a physical activity intervention for WIC mothers. Ann Behav Med. 2004; 27(2):82–90. [PubMed: 15026292]

Hall LA, Williams CA, Greenberg RS. Supports, stressors, and depressive symptoms in low-income mothers of young children. Am J Publ Health. 1985; 75(5):518–522.

Holden KC, Smock PJ. The economic costs of marital dissolution: why do women bear a disproportionate cost? Annu Rev Sociol. 1991; 17:51–78. [PubMed: 12285404]

Hosmer, DW.; Lemeshow, SL. Applied Logistic Regression. 2nd ed.. New York: John Wiley & Sons, Inc; 2000.

Jeffery RW, French SA. Epidemic obesity in the United States: are fast foods and television viewing contributing? Am J Public Health. 1998; 88(2):277–280. [PubMed: 9491022]

Kandula NR, Lauderdale DS. Leisure time, non-leisure time, and occupational physical activity in Asian Americans. Ann Epidemiol. 2005; 15(4):257–265. [PubMed: 15780772]

King AC, Goldberg JH, Salmon J, Owen N, Dunstan D, Weber D, et al. Identifying subgroups of U.S. adults at risk for prolonged television viewing to inform program development. Am J Prev Med. 2010; 38(1):17–26. [PubMed: 20117553]

Kroenke K, Spitzer RL, Williams JB. The PHQ-9: validity of a brief depression severity measure. J Gen Intern Med. 2001; 16(9):606–613. [PubMed: 11556941]

Langlois J, Fortin D. [Single-parent mothers, poverty and mental health: review of the literature]. Sante Ment Que. 1994; 19(1):157–173. [PubMed: 7794997]

Li K, Seo DC, Torabi MR, Peng CY, Kay NS, Kolbe LJ. Leisure-time physical activity and obesity in black adults in Indianapolis. Am J Health Behav. 2010; 34(4):442–452. [PubMed: 20218756]

NHLBI Obesity Education Initiative Expert Panel. Clinical guidelines on the identification, evaluation, and treatment of overweight and obesity in adults: executive summary. Am J Clin Nutr. 1998; 68(4):899–917. [PubMed: 9771869]

Proper KI, Singh AS, van Mechelen W, Chinapaw MJ. Sedentary behaviors and health outcomes among adults: a systematic review of prospective studies. Am J Prev Med. 2011; 40(2):174–182. [PubMed: 21238866]

Richmond TK, Walls CE, Gooding HC, Field AE. Television viewing is not predictive of BMI in Black and Hispanic young adult females. Obesity. 2010; 18(5):1015–1020. [PubMed: 19876003]

Sallis, JF.; Owen, N. Ecological Models of Health Behavior. In: Glanz, K.; Rimer, BK.; Viswanath, K., editors. Health behavior and health education : theory, research, and practice. 3th ed. San Francisco, CA: Jossey-Bass; 2002. p. 552

Sanderson B, Littleton M, Pulley L. Environmental, policy, and cultural factors related to physical activity among rural, African American women. Women Health. 2002; 36(2):75–90. [PubMed: 12487142]

Sarmiento IA, Cardemil EV. Family functioning and depression in low-income Latino couples. J Marital Fam Ther. 2009; 35(4):432–445. [PubMed: 19785700]

Scharff DP, Homan S, Kreuter M, Brennan L. Factors associated with physical activity in women across the life span: implications for program development. Women Health. 1999; 29(2):115–134. [PubMed: 10427652]

Sieverdes JC, Ray BM, Sui X, Lee DC, Hand GA, Baruth M, et al. Association between leisure time physical activity and depressive symptoms in men. Med Sci Sports Exerc. 2012; 44(2):260–265. [PubMed: 21775904]

Sugiyama T, Healy GN, Dunstan DW, Salmon J, Owen N. Is television viewing time a marker of a broader pattern of sedentary behavior? Ann Behav Med. 2008; 35(2):245–250. [PubMed: 18357498]

Teychenne M, Ball K, Salmon J. Associations between physical activity and depressive symptoms in women. Int J Behav Nutr Phys Act. 2008a; 5:27. [PubMed: 18460191]

Teychenne M, Ball K, Salmon J. Physical activity and likelihood of depression in adults: a review. Prev Med. 2008b; 46(5):397–411. [PubMed: 18289655]

Teychenne M, Ball K, Salmon J. Physical activity, sedentary behavior and depression among disadvantaged women. Health Educ Res. 2010; 25(4):632–644. [PubMed: 20145009]

U.S. Department of Agriculture F.a. N.S. Office of Research and Analysis. SNAP Education and Evaluation Case Study Report: New York State Department of Health's Eat Well Play Hard in Child Care Settings Program. In: Gabor, V.; Williams, P.; Cates, S.; Blitstein, J.; Bell, L.; Hersey, J., editors. Sara Olson, Alexandria, VA: Project Officer; 2012.

U.S. Department of Health and Human Services. 2008 physical activity guidelines for Americans : be active, healthy, and happy!. Washington, DC: Author; 2008.

Vanhecke TE, Franklin BA, Miller WM, deJong AT, Coleman CJ, McCullough PA. Cardiorespiratory fitness and sedentary lifestyle in the morbidly obese. Clin Cardiol. 2009; 32(3):121–124. [PubMed: 19301295]

Wen LM, Simpson JM, Baur LA, Rissel C, Flood VM. Family functioning and obesity risk behaviors: implications for early obesity intervention. Obesity (Silver Spring). 2011; 19(6):1252–1258. [PubMed: 21127478]

Wijndaele K, Brage S, Besson H, Khaw KT, Sharp SJ, Luben R, et al. Television viewing time independently predicts all-cause and cardiovascular mortality: the EPIC Norfolk Study. Int J Epidemiol. 2010

Wilbur J, Michaels Miller A, Chandler P, McDevitt J. Determinants of physical activity and adherence to a 24-week home-based walking program in African American and Caucasian women. Res Nurs Health. 2003; 26(3):213–224. [PubMed: 12754729]

Yeager KK, Macera CA, Merritt RK. Socioeconomic influences on leisure-time sedentary behavior among women. Am J Health Behav, Educ & Promot. 1993; 17(6):50–54.

TABLE 1

Relationship of Variables to Maternal TV Viewing Time and Leisure-Time Physical Activity

	TV viewing time (min) †				<150 min/wk LTPA‡			
	n	Mean (SD)	F	*p*	n	%	χ^2	*p*
Total	131	186.1 (103.1)	-	-	131	36.0	-	-
Race			0.30	.58			0.42	.81
Black	24	197.1 (94.0)			24	41.7		
White	93	183.6 (109.4)			92	38.0		
Other	4	160.71 (119.2)			4	25.0		
Age group			0.59	.55			2.45	.29
< 30 years	84	194.3 (108.3)			83	33.5		
30 – 39.9 years	27	171.0 (91.9)			27	48.1		
40 years or older	16	177.1 (104.6)			16	43.8		
Marital status			0.17	.69			1.74	.19
Married/unmarried couple	54	190.4 (84.8)			53	43.4		
Single	75	182.8 (116.2)			75	31.0		
Work Status			0.57	.45			3.23	.07
Full time/part time work	68	180.1 (97.4)			77	29.9		
Not Full time/part time work	49	195.1 (118.0)			53	45.3		
Maternal weight status			0.83	.36			2.98	.08
Obese (BMI ≥ 30)	43	200.2 (86.4)			42	45.2		
Non-obese (BMI < 30)	78	182.2 (112.5)			78	29.5		
Maternal education			0.62	.54			3.56	.17
Less than high school	27	190.9 (96.7)			26	38.5		
High school graduated	49	196.4 (122.2)			49	44.9		
More than high school	55	174.5 (87.1)			55	27.3		
# of children in household			2.03	.10			451	0.21
1	20	222.7 (99.4)			30	43.3		
2	52	181.0 (119.9)			51	35.3		
3	28	154.1 (75.2)			28	21.4		
4 or more	21	189.2 (83.4)			21	47.6		

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	TV viewing time (min) †				<150 min/wk LTPA‡			
	n	**Mean (SD)**	**F**	***p***	**n**	**%**	**χ^2**	***p***
Maternal LTPA			9.17	<.01	-	-	-	-
<150 min LTPA/wk	47	221.9 (114.1)						
≥150 min LTPA/wk	83	222.0 (114.1)			-	-		

†ANOVA was used to compare the difference in TV viewing time as a continuous variable between groups of independent variables.

‡Chi-square test was used to test the association between LTPA as a dichotomous variable and other categorical variables.

LTPA: leisure-time physical activity.

Single includes divorced, widowed, separated and never married single.

TABLE 2

Hierarchical Linear Regressions of Maternal TV Viewing Time (n = 131)

	Individual association		Model 1: number of children and depressive symptoms		Model 2: number of children, depressive symptoms and perceived stress		Model 3: number of children, perceived stress, depressive symptoms, and family functioning	
	B	**95% CI**	**B**	**95% CI**	**B**	**95% CI**	**B**	**95% CI**
Number of children†								
2	−41.7	−87.8 – 4.4	−30.7	−74.3 – 12.9	−27.2	−71.3 – 16.8	−34.0	−78.0 – 9.9
3	−68.7*	−121.5 – −15.8	−46.2	−96.8 – 4.5	−42.7	−93.8 – 8.4	−48.2	−98.9 – 2.5
4	−33.5	−90.8 – 23.7	−30.7	−84.5 – 23.0	−25.8	−80.3 – 28.7	−32.2	−86.8 – 21.5
Depressive symptoms‡	105.5***	61.3 – 149.7	97.4***	52.1 – 142.7	83.3**	31.2 – 135.4	76.4**	24.6 – 128.2
Perceived stress#	39.7***	16.9 – 62.5			14.2	−11.8 – 40.2	5.8	−21.1 – 32.7
Family functioning#	49.8***	19.6 – 80.0					33.0*	1.5 – 64.5
			vs. covariate-only Model, $\Delta R^2 \uparrow$ 12%, p <.001		vs. Model 1, p >.05		vs. Model 2, $\Delta R^2 \uparrow$3%, p <.05	

* p <.05,

** p <.01,

*** p<.001

† 2, 3, and 4 children were dummy variables compared to 1 child as a reference.

‡ Dichotomous variable: Moderate depressive symptoms (PHQ-9 score ≥ 10) vs. No depressive symptoms (PHQ-9 score < 10) as the reference.

\# Continuous variable.

TABLE 3

Hierarchical Logistic Regressions of Maternal Low Leisure-Time Physical Activity (n=131)

	Individual association		Model 1: maternal weight status, work status and depressive symptoms		Model 2: maternal weight status, work status, depressive symptoms and perceived stress,	
	OR	**95% CI**	**AOR**	**95% CI**	**AOR**	**95% CI**
Weight status						
Non-obese (BMI < 30)	Reference		Reference		Reference	
Obese (BMI ≥ 30)	2.0	0.9 – 4.3	1.9	0.8 – 3.9	1.6	0.7 – 3.7
Work Status						
Full time/part time work	Reference		Reference		Reference	
Not Full time/part time work	0.5	0.2 – 1.1	0.5	`0.2 – 1.0	0.5	0.2 – 1.0
Depressive symptoms[‡]						
No depressive symptoms	Reference		Reference		Reference	
Moderate depressive symptoms	2.5[*]	1.0 – 6.3	2.3[‡]	0.9 – 6.2	1.7	0.5 – 5.3
Perceived stress[#]	1.79[*]	1.1 - 3.0			1.4	0.8 – 2.6
			vs. covariate-only Model, $\Delta\chi^2 = 2.8$, $p = .09$		vs. Model 1, $\Delta\chi^2 = 1.2$, $p = .28$	

[*] $p < .05$,

[‡] $p = 0.09$.

[†] Dichotomous variable: Moderate depressive symptoms (1) = PHQ-9 score ≥ 10 vs. No depressive symptoms (0) = PHQ-9 score < 10.

[#] Continuous variable.