Prospective Associations Between Fathers’ Engagement in Infant Caregiving and Their Weight-Related Behaviors and Mental Health

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Abstract
Fathers’ engagement in infant caregiving is linked with positive social, emotional, and developmental outcomes in children; however, its relationship with fathers’ own health is largely unknown. This longitudinal study examined associations between fathers’ caregiving engagement with their 6-month-old infants and their physical activity, sugar-sweetened beverage (SSB) consumption, nighttime sleep duration, and depressive symptoms 6 months later when infants were 12 months old. Participants were 143 fathers of infants (62.7% non-Hispanic White, 82.3% with a bachelor’s degree). Fathers reported their frequency of engagement in seven caregiving activities when infants were 6 months old. Fathers’ physical activity, SSB consumption, nighttime sleep duration, and depressive symptoms were assessed when infants were 6 and 12 months old. Multivariate logistic regression analysis was used to assess if fathers who reported higher infant caregiving at 6 months had more positive health outcomes at 12 months, controlling for fathers’ age, race/ethnicity, education, employment, household income, and the outcome at 6 months. Fathers who reported higher caregiving engagement when infants were 6 months old had increased odds of being sufficiently physically active 6 months later (unadjusted odds ratio [OR] = 1.19, 95% confidence interval [CI] = [1.00, 1.41]; adjusted OR = 1.47, 95% CI = [1.11, 1.96]). No links were identified between fathers’ caregiving engagement and their SSB consumption, nighttime sleep duration, or depressive symptoms. In summary, fathers’ engagement in infant caregiving may be beneficial to their physical activity in the first year after birth. There was insufficient evidence in this study that the benefits of caregiving engagement were experienced broadly across multiple health outcomes.

Keywords
fathers, engagement, caregiving, physical activity, weight-related health

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Introduction
Men in the United States are becoming more engaged in child caregiving (Livingston & Parker, 2019). While we know that fathers’ early engagement is beneficial for children’s developmental, psychological, and cognitive outcomes (Amodia-Bidakowska et al., 2020; Behson et al., 2018; Rollé et al., 2019; Yogman et al., 2016), the impacts of fathers’ caregiving engagement on fathers’ own health are largely unknown (Grau-Grau et al., 2022). Previous studies reported that entering parenthood may put men at higher risks of weight gain (Garfield et al., 2016; Rattay & von der Lippe, 2020; Saxbe et al., 2018; Umberson et al., 2011), reduced physical activity (Pot & Keizer, 2016;
Rattay & von der Lippe, 2020; Saxbe et al., 2018), less sleep (Saxbe et al., 2018; Wynter et al., 2020), and depression (Saxbe et al., 2018; Wynter et al., 2020). Beyond becoming a father, it is unclear if fathers’ level of engagement in infant caregiving plays a role in shaping their weight-related behaviors and mental health. This research brief examines the relationship between fathers’ engagement in caregiving with their 6-month-old infants and their weight-related behaviors and mental health 6 months later.

There are divergent perspectives on the potential impact of caregiving engagement on fathers’ behaviors and health. The role strain perspective argues that resources are finite and that additional roles and responsibilities will lead to role overload and risky behaviors (Goode, 1960). Conversely, the role enhancement perspective predicts positive effects of caregiving engagement because a greater number of roles and responsibilities enhance one’s resources, social connections, and positive emotions, which collectively outweigh or mitigate the strain from having multiple roles and responsibilities (Sieber, 1974).

While prior research has reported that fathers gain more weight in the long term and have poorer weight-related behavioral and mental health outcomes in comparison with childless men (Saxbe et al., 2018), studies that have examined social roles in men, including the role of fatherhood, generally support the role enhancement perspective; in industrialized countries, men who occupy more social roles including being a father have better health outcomes than those with fewer social roles (DePasquale et al., 2018; Janzen & Muhajarine, 2003; Kuntsche et al., 2009; Takeda et al., 2006; von der Lippe & Rattay, 2016). Several weaknesses or characteristics of prior social role studies limit our understanding of how the role of fatherhood may influence men’s weight-related behaviors and associated mental health outcomes. First, prior social role research largely relied on cross-sectional designs, precluding conclusions about the prospective effects of caregiving on men’s health. Second, most studies have focused on men’s self-rated health and psychosocial well-being with little attention given to fathers’ weight-related behaviors that are consistently linked with risk of weight gain including physical activity (Cleven et al., 2020; Jakicic et al., 2019), sugar-sweetened beverage (SSB) consumption (Hu, 2013; Luger et al., 2017), and sleep (Bacaro et al., 2020; Cooper et al., 2018). This limits our understanding on the mechanisms that might put men at higher risks of weight gain after becoming a father. Third, prior social role studies have also overlooked the distinct variations of fathers’ caregiving demands and responsibilities over the course of fatherhood. Compared with fathers with older children, caregiving demands are much higher among fathers with infants.

Using a longitudinal design, this study extends prior research by examining the relationship between fathers’ engagement in caregiving with their 6-month-old infants and their self-reported physical activity, SSB consumption, sleep, and depressive symptoms 6 months later. The inclusion of depressive symptoms as a weight-related mental health outcome is because depression and obesity often coexist (Mediouni et al., 2020; Weiss et al., 2020) and depression appears to increase the likelihood of engaging in unhealthy weight-related behaviors such as physical inactivity (Helgadóttir et al., 2015; Schuch et al., 2017; Vancampfort et al., 2017). Consistent with the results of prior social role studies (DePasquale et al., 2018; Janzen & Muhajarine, 2003; Kuntsche et al., 2009; Takeda et al., 2006; von der Lippe & Rattay, 2016), we anticipate that results will support the role enhancement perspective and illustrate the benefits of caregiving on men’s weight-related health.

Method

Study Participants

This study included fathers who participated in a longitudinal, prospective observational study examining associations between infant sleep patterns and growth from birth to 24 months: Rise & Sleep Health in Infancy & Early Childhood (SHINE) birth cohort. Detailed recruitment strategies have been described elsewhere (Yu et al., 2021). Briefly, between 2016 and 2018, 224 fathers were recruited along with mothers and infants after delivery at Massachusetts General Hospital in Boston, Massachusetts. Eligibility for fathers included living in the same household as the mothers and infants and being the biological father of the infant. We recruited residential biological fathers to foster greater retention rates at follow-ups. To remain eligible in the study, fathers had to sleep in the same home as the study infant at least one night per week at follow-ups. Our analytical sample included 143 fathers who completed the study questionnaires at intake and when their infants were approximately 6 and 12 months old. The Partners Health Care Institutional Review Board reviewed and approved all the study activities (protocol # 2015P002292). All participants included in the study provided their written informed consent.

Measures

At each time point, fathers completed a brief online survey. Fathers’ caregiving engagement was measured when infants were 6 months old. Fathers’ physical activity, SSB consumption, nighttime sleep duration, and depressive symptoms were assessed when infants were 6 and 12 months old.
Caregiving engagement was measured using 7 items from the Early Childhood Longitudinal Study-Birth cohort survey (Avenilla et al., 2006). Using a 6-point response scale (0 = never, 1 = rarely, 2 = a few times a month, 3 = a few times a week, 4 = about once a day, 5 = more than once a day), items assessed the frequency of engagement in preparing meals, feeding, changing diapers, putting child to sleep, bathing, taking child outside the home, and dressing child. Each item was rescored to reflect whether fathers engaged in the activity at least daily and then summed to create a composite daily caregiving engagement score ranging from 0 to 7 indicating the number of caregiving activities in which they engaged on a daily basis.

Physical activity was measured using the Godin Leisure-Time Exercise Questionnaire (GLTEQ). Responses to items assessing moderate and strenuous activity were used to calculate whether participants were sufficiently physically active using the recommended cut-off of 24 units. Prior research supports the validity of the GLTEQ in a wide range of populations (Amireault et al., 2015; Amireault & Godin, 2015; Motl et al., 2018; van Poppel et al., 2010).

SSB consumption was measured using validated questions from the National Health and Nutrition Examination Survey (NHANES) Dietary Screener Questionnaire (DSQ) (National Cancer Institute Division of Cancer Control & Population Science, 2021). SSB consumption was dichotomized into less than once per week and at least once per week based on the general recommendations that SSB consumption should be minimized (Dietary Guidelines Advisory Committee, 2015).

Nighttime sleep duration was calculated based on responses to items assessing weekend and weekend night sleep duration ([hours of nighttime sleep per week*5] + [hours of nighttime sleep per weekend day*2]) / 7. Average nighttime sleep duration was dichotomized into <7 hr and ≥7 hr based on current recommendations (Consensus Conference Panel et al., 2015).

Depressive symptoms were screened using the 2-item Patient Health Questionnaire (PHQ-2). PHQ-2, which has been validated in prior research (Chae et al., 2012; Gjerdincjen et al., 2009), assesses depressed mood and anhedonia (i.e., little interest or pleasure in doing things) with a positive response to either item indicating the presence of depressive symptoms (i.e., a positive screening) and the need for further evaluations.

Demographic characteristics included fathers’ race/ethnicity, age, educational attainment, family household income, and employment status. Age, race/ethnicity, and education were measured at study intake (i.e., the infant’s birth). Household income and employment status were measured at birth and when infants were 6 months old; the measures at 6 months were utilized.

Statistical Analysis

Descriptive statistics (percentages/counts) were used to characterize participants’ demographics and health outcomes. Multivariate logistic regression models were fit to estimate the odds ratio (OR) association between fathers’ caregiving engagement at 6 months and each of being sufficiently physically active, consuming SSBs less than once a week, getting at least 7 hr of nighttime sleep, and having no depressive symptoms when infants were 12 months old. Each outcome variable was assessed separately, with both unadjusted and adjusted models fit. In the latter, we controlled for fathers’ race/ethnicity, education, age, employment status, and annual household income along with the outcome at 6 months. Controlling for the outcomes at 6 months in the adjusted models was to account for the potential influence of fathers’ health outcomes at 6 months on their 12 months’ health outcomes. We considered children’s temperament, number of children in the household, child care usage, mothers’ breastfeeding status, mothers’ employment status, and coparenting support as potential covariates as they might drive fathers’ engagement (Diniz et al., 2021). We decided not to include them as covariates because their direct effects on paternal weight-related health are unclear in the current literature and none of them were associated with both fathers’ engagement and our outcome variables in this study through bivariate examinations. Analyses were conducted using SAS version 9.4 software (SAS institute Inc., Cary, NC, USA). Throughout, statistical significance was evaluated at the alpha = .05 level.

Results

The majority of the fathers were between 30 and 39 years old (n = 105; 76.1%), had completed a bachelor’s degree or beyond (n = 116; 82.3%), were employed full time (n = 127; 89.4%), and had an annual household income of US$80,000 or higher (n = 110; 78.6%) (Table 1). Slightly more than half of the fathers were non-Hispanic White (n = 89; 62.7%) with much smaller proportions of Hispanic or Latino (n = 20; 14.1%), Asian (n = 24; 16.9%), and Black/African American (n = 9; 6.3%). At 6 months, on a daily basis, 36 fathers (25.5%) engaged in 0 to 2 caregiving activities, 78 fathers (55.3%) engaged in 3 to 5 caregiving activities, and 27 fathers (19.2%) engaged in 6 to 7 caregiving activities.

In unadjusted logistic regression models, fathers’ caregiving engagement at 6 months was marginally associated with their physical activity at 12 months (unadjusted OR = 1.19; 95% confidence interval [CI] = [1.00, 1.41]); no relationships were identified between fathers’ caregiving engagement at 6 months and their SSB consumption (unadjusted OR = 0.86; 95% CI = [0.72, 1.02]), nighttime
sleep duration (unadjusted OR = 1.01; 95% CI = [0.85, 1.19]), and depressive symptoms (unadjusted OR = 1.02; 95% CI = [0.84, 1.23]) at 12 months (Table 2). In adjusted models, the association between fathers’ caregiving engagement and physical activity was statistically significant with an increased odds of being sufficiently physically active (adjusted OR = 1.47; 95% CI = [1.11, 1.96]); for every additional caregiving activity that fathers engaged in on a daily basis, there was a 47% increase in the odds of them attaining sufficient physical activity at 12 months. Findings for fathers’ SSB consumption (adjusted OR = 0.95; 95% CI = [0.77, 1.18]), nighttime sleep duration (adjusted OR = 1.12; 95% CI = [0.86, 1.47]), and depressive symptoms (adjusted OR = 1.03; 95% CI = [0.81, 1.30]) did not change in the adjusted models.

**Discussion**

In this study, we found limited evidence to support the role enhancement prospective and no evidence to support the role strain perspective. Fathers reporting greater caregiving engagement at 6 months had a greater likelihood of being sufficiently physically active at 12 months. Fathers’ caregiving engagement was not associated with fathers’ nighttime sleep duration, SSB consumption, or depressive symptoms. From the role enhancement perspective, the positive association between fathers’ caregiving engagement and their physical activity level can be partly due to the resources and supports that fathers gained through providing infant care to mitigate the competing demands between work and family for physical activity. Prior studies have reported that when fathers are more involved with their children, they are more satisfied with their lives, more socialized, and more connected with their families and communities (Behson et al., 2018). There are a number of factors that could explain the positive effects of caregiving were limited to fathers’ physical activity. This relationship may be explained by a unique aspect of fathering where fathers generally engage in more physical play with their children and are more likely to role model physical activity than mothers (Amodia-Bidakowska et al., 2020). There may not be clear links between fathers’ diet and their approach to parenting. The general lack of association between fathers’ caregiving engagement and their weight-related behaviors and mental health in our study aligns with prior observations that paid work or employment is more pertinent to men’s health, while parent and partner roles are more pertinent to women’s health (Glauber & Day, 2018; von der Lippe & Rattay, 2016).

Our study’s null findings also suggest that there may be other more important factors other than caregiving to trigger changes in fathers’ weight-related behaviors and mental health entering fatherhood. For example, access to parental leave and flexible work arrangements are consistently

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**Table 1. Fathers’ Characteristics (n = 143).**

| Socioeconomic characteristics | N   | %  |
|-------------------------------|-----|----|
| **Age (years)**               |     |    |
| <30                           | 13  | 9.4|
| 30–34                         | 50  | 36.2|
| 35–39                         | 55  | 39.9|
| ≥40                           | 20  | 14.5|
| Missing                       | 5   | —  |
| **Race/ethnicity**            |     |    |
| White                         | 89  | 62.7|
| Black or African American      | 9   | 6.3 |
| Asian                         | 24  | 16.9|
| Hispanic or Latino            | 20  | 14.1|
| Missing                       | 1   | —  |
| **Education level at study intake** |     |    |
| <Bachelor’s degree            | 25  | 17.7|
| Bachelor’s degree             | 40  | 28.4|
| ≥Graduate degree or higher    | 76  | 53.9|
| Missing                       | 2   | —  |
| **Employment status at 6 months** |     |    |
| Employed full time            | 127 | 89.4|
| Employed part time            | 9   | 6.3 |
| Not in the workforce          | 6   | 4.2 |
| Missing                       | 1   | —  |
| **Household income at 6 months** |     |    |
| <US$80,000                    | 30  | 21.4|
| US$80,000–US$199,999          | 57  | 40.7|
| ≥US$200,000                   | 53  | 37.9|
| Missing                       | 3   | —  |
| **Behavioral characteristics at 12 months** |     |    |
| **Average nighttime sleep duration (hr)** |     |    |
| <7                            | 78  | 54.9|
| ≥7                            | 64  | 45.1|
| Missing                       | 1   | —  |
| **Sugar-sweetened beverage consumption** |     |    |
| <Once per week                | 82  | 42.3|
| ≥Once per week                | 60  | 57.8|
| Missing                       | 1   | —  |
| **Physical activity**         |     |    |
| Insufficiently active         | 68  | 48.6|
| Sufficiently active           | 72  | 51.4|
| Missing                       | 3   | —  |
| **Depressive symptoms**       |     |    |
| Negative                      | 105 | 73.4|
| Positive                      | 38  | 26.6|
| Missing                       | 0   | —  |
| **Count of daily caregiving engagement at 6 months** |     |    |
| 0                             | 14  | 9.9 |
| 1                             | 9   | 6.4 |
| 2                             | 13  | 9.2 |
| 3                             | 24  | 17.0|
| 4                             | 23  | 16.3|
| 5                             | 31  | 22.0|
| 6                             | 18  | 12.8|
| 7                             | 9   | 6.4 |
| Missing                       | 2   | —  |

*Based on the Godin Leisure-Time Exercise Questionnaire with a score ≥24 indicating being sufficiently active. **Based on the 2-item Patient Health Questionnaire (PHQ-2) with a score ≥0 out of 6 points indicating a positive depressive symptoms screening and signaling the need for a confirmatory test.*
identified to be critical for fathers to enhance work–family balance (Ewald et al., 2020), and failure to do so might contribute to poor sleep (Buxton et al., 2016; Cardenas et al., 2021), unhealthy eating (Bauer et al., 2012), and poor mental health (Allen et al., 2000; Cardenas et al., 2021). At the personal level, social cognitive factors such as self-regulation and motivation are identified to be important factors in regulating weight-related behaviors in prior studies (Greaves et al., 2017). Future research should examine how these policy and individual factors influence fathers’ weight-related behaviors and mental health over the course of fatherhood.

This study has two main strengths. First, the use of a longitudinal design contributes to our understanding of the prospective associations between fathers’ engagement level and health. Second, unlike the majority of the past research on social roles, we measured fathers’ caregiving engagement frequencies in our study, acknowledging the variability of fathers’ caregiving engagement across households. Our study has some limitations. Fathers in our study were from the greater Boston area, generally older, biological fathers living with the mothers and infants, and with mid to high socioeconomic status. Findings may not be generalizable to other populations. In addition, fathers self-reported their engagement level and health outcomes, which might have contributed measurement error. We did not measure fathers’ education attainment beyond study intake at 6 months. Although unlikely, fathers’ education might have changed since their child’s birth. Finally, only a small portion of fathers reported depressive symptoms. This might have limited our ability to detect meaningful associations between caregiving engagement and depressive symptoms.

Conclusion

This study provides novel information on the prospective associations between fathers’ caregiving engagement and their weight-related outcomes. Fathers with greater caregiving engagement when the infants were 6 months old were more likely to be sufficiently physically active 6 months later, and the time that fathers devote to infant caregiving does not have negative ramifications for their own health. Given the widespread benefits of father engagement on children’s health and developmental outcomes (Amodia-Bidakowska et al., 2020; Behson et al., 2018; Rollè et al., 2019; Yogman et al., 2016), findings of our study further suggest that father engagement should be highly encouraged, possibly through paternity leave policies and flexible work arrangements.

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Declaration of Conflicting Interests

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Amireault, S., & Godin, G. (2015). The Godin-Shephard Leisure-Time Physical Activity Questionnaire: Validity Table 2. Prospective Associations Between Fathers’ Caregiving Engagement at 6 Months and Paternal Weight-Related Behaviors and Mental Health at 12 Months.

| Paternal weight-related behaviors and mental health at 12 months | Fathers’ daily caregiving engagement count at 6 months | Unadjusted | Adjusteda |
|---|---|---|---|
| | | Odds ratio [95% CI] | Odds ratio [95% CI] |
| Being sufficiently physically active | 1.19 [1.00–1.41] | **1.47** [1.11–1.96] |
| Consuming SSBs less than once per week | 0.86 [0.72–1.02] | 0.95 [0.77–1.18] |
| Having at least 7 hr of nighttime sleep | 1.01 [0.85–1.19] | 1.12 [0.86–1.47] |
| No depressive symptoms | 1.02 [0.84–1.23] | 1.03 [0.81–1.30] |

Note. Boldface indicates statistical significance (*p < .01). SSBs = sugar-sweetened beverages; CI = confidence interval.

aControlled for fathers’ age (continuous), fathers’ race/ethnicity (White, Asian, African American/Latino), fathers’ education (<a bachelor’s degree, bachelor’s degree, ≥ graduate degree) at intake, fathers’ employment at 6 months (full-time, not full-time), annual household income at 6 months (< US$80,000, US$80,000-US$199,999, ≥ US$200,000), and outcome at 6 months.
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