

Parents' use of intentional modeling and social control to influence their adolescent's health behavior: Findings from the FLASHE study

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Abstract

Using data from the Family Life, Activity, Sun, Health, and Eating (FLASHE) study, we examined how adolescents' age as well as parents' and their adolescent's gender are associated with the influence strategies parents use to promote healthy behaviors. Parents reported their use of intentional modeling and social control for four health behaviors: fruit and vegetable consumption, junk food consumption, physical activity, and screen time. We found that parents' reports of both intentional modeling and social control were lower for adolescents who were older. Additionally, parents reported using more intentional modeling with their same-gender children, but more social control with their sons. For certain health behaviors, the gender of parents and adolescents interacted with adolescents' age to predict the reported use of social control. Overall, this work highlights the importance of delineating both the similarities and differences in how mothers and fathers use influence to shape the health behavior of their adolescents.

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Parents have a vested interest in the health of their children and one important aspect of being a parent is influencing child health behavior for the better (Bleakley et al., 2013; Simons-Morton & Chen, 2005). Thus, social influence, a core feature of social psychological theory and research (Cialdini & Griskevicius, 2010), occurs within family dynamics. Considering the well-supported connection between relationships and physical health (Slatcher & Selcuk, 2017) and the unique role that parents play in the lives of their children, understanding patterns of influence within parent-child relationships is essential.

Investigators have examined the different types of behavioral influence strategies that parents use to alter their children's health behavior (Alderman et al., 2010; Brown & Ogden, 2004; Schoeppe et al., 2016). The two most common strategies that parents use to influence their children's health-relevant behaviors are *intentional modeling* (an indirect influence strategy) and *social control* (a direct influence strategy). Both broad forms of influence can elicit changes in a child's health behavior throughout childhood and into adolescence (Brown & Ogden, 2004). Relatively little is known, however, about the conditions under which parents use these two strategies. In particular, little work has examined whether the age and gender of the child and/or the gender of the parent are associated with the likelihood that parents employ intentional modeling and/or social control to influence the health behavior of their adolescent children. Prior research has indicated that daughters are impacted by parental weight-related perceptions and behaviors more so than sons (Hochgraf et al., 2019; Wertheim, 2002), that parents may grant greater autonomy to their children as they age, and that concerns about autonomy might affect which influence strategy is used (Koepeke & Denissen, 2012; Umberson et al., 2010). Viewed together, these findings suggest that certain characteristics of the parent (e.g., their gender) and their adolescent child (e.g., their gender and age) may affect the type of influence—intentional modeling and/or social control—that parents typically use. Leveraging a nationally representative sample of parents and their adolescent children, the current research examines how the characteristics of *both* parents and their adolescents are associated with parents' reports of intentionally using modeling and/or social control to influence their children across four health behavior domains.

Parents' use of social control and intentional modeling

It is particularly important for parents to shape the behavioral practices of their children (e.g., physical activity, diet) when those behaviors might have immediate or long-term effects on their child's health (Malina, 2001). Although many forms of influence exist, parents tend to utilize two common forms: *social control*, in which parents use direct influence tactics to change their adolescent's behavior by setting rules or monitoring their adolescent's behavior, which usually limits their autonomy, and *intentional modeling*, in which parents deliberately enact behaviors in front of their adolescents that they

want to see them adopt (Yao & Rhodes, 2015; Zhang et al., 2019). Intentional modeling differs from behavioral modeling, which occurs when parents' behaviors are witnessed by their adolescents, but the behaviors are not enacted with the specific intent to influence their adolescent's behavior (Yee et al., 2017).

Parents can exercise social control by establishing and enforcing rules based on their own preferences about which specific health behaviors they want their children to engage in (Fleary & Ettienne, 2019). A parent, for example, might set rules about how many servings of vegetables their adolescent should eat each day. Indeed, parental social control has been studied within several different health behaviors, ranging from reducing unhealthy food consumption to decreasing tobacco use, and it is commonly used by parents to elicit change in behavior (Ennett et al., 2001; Fleary & Ettienne, 2019). In general, social control tactics such as the setting of rules by parents around eating behavior or offering rewards to encourage someone to either increase or decrease a health behavior can be somewhat effective in changing health behavior (Brown & Ogden, 2004; Lewis & Rook, 1999). However, social control can take various forms and, therefore, their effectiveness is contingent on the specific social control tactic used and how it is delivered by a parent.

However, there are times when parents may opt for a less controlling and less direct influence strategy (Ma & Hample, 2018). For example, parents may prefer to model the behavior they would like their adolescents to enact intentionally (e.g., deliberately eating vegetables in front of them). Although the behaviors parents engage in around their children offer numerous opportunities for modeling simply by chance, intentional modeling is distinct because it deliberately, yet indirectly, conveys the specific behaviors or actions that a parent would like their child to emulate. In the current work, we focus on intentional modeling (see Bandura, 1986, for a broader discussion of modeling).

Previous studies have investigated parental modeling, behavioral and/or intentional, in health behaviors such as physical activity, the consumption of unhealthy food and sugar sweetened beverages, and dieting behavior (Garriguet et al., 2017; Ma & Hample, 2018; Wertheim et al., 1999). Collectively, these studies have found that parental modeling can increase physical activity, increase eating-related self-efficacy, and encourage dieting behavior.

Do influence strategies vary with gender and age?

Both the gender and age of adolescents are important to consider in understanding when and with whom parents use intentional modeling and social control to shape their adolescents' health behavior. Despite some interest in the effects that gender and age may have on influence patterns in parent-child relationships, relatively little empirical work has addressed these issues (for exceptions see Edwardson & Gorely, 2010). This is particularly true regarding the degree to which gender and age are associated with the enactment of social control and/or intentional modeling. Past research has revealed some gender differences in the effectiveness of modeling on children and has discussed how age differences may alter the effectiveness of modeling in general (Garriguet et al., 2017). However, no research to our knowledge has investigated whether or how these characteristics are related to the two broad forms of influence that parents often use. As

adolescents get older, parents may decide to reduce their use of social control and increase their use of intentional modeling as a way to tailor their influence tactics to their adolescent's increasing need for autonomy (Koepeke & Denissen, 2012). Moreover, when deciding how to enact influence, parents may increasingly consider their adolescent's gender as adolescents grow older.

Gender. In nearly all prior studies involving social influence and health behavior, gender has been treated as a binary, self-reported identity (Magliozzi et al., 2016). Research on parental use of intentional modeling has typically focused on how patterns of influence enacted by either a same or different gender parent varies. With regard to eating and physical activity, for example, modeling—both behavioral and intentional—has been shown to be more impactful when it is enacted by same-gender as opposed to opposite-gender parents (eating: Arroyo et al., 2017; physical activity: Schoeppe et al., 2016). However, a review of parental influence on physical activity found that fathers are particularly influential when modeling physical activity to both their adolescent sons and daughters, as indicated by increased levels of physical activity in both sons and daughters who have more active fathers (Edwardson & Gorely, 2010). Despite this initial evidence, we do not know whether parents use *intentional* modeling more frequently with a same-gender as opposed to an opposite-gender adolescent.

Research on social control has also considered differences between mothers and fathers but has focused primarily on the use of this strategy with daughters in relation to their eating and activity, given the societal pressures surrounding the weight of girls (Wertheim et al., 1999). Mother-daughter dyads have received the most attention, particularly with respect to mothers' attempts to control their daughters' eating behavior (Francis & Birch, 2005). Even at the age of five, parents are more concerned with managing the eating behavior and weight of their daughters than their sons (Lipowska et al., 2018). Thus, parents—particularly mothers—may use social control to influence their daughter's health behavior more frequently than their son's health behavior. Research examining fathers' use of social control has been more limited. Hochgraf and colleagues (2019) found that fathers' perception of their adolescent's weight has a unique effect on their daughter's, but not their son's, weight concerns. However, it remains unclear whether this difference in weight concerns translates to differences in the use of controlling influence strategies.

Age. As adolescents grow and become increasingly autonomous across the teenage years, parents may need to be strategic about the types of influence strategies and tactics they enact. For example, parents may need to decrease their reliance on social control to avoid eliciting reactance or resistance from older adolescents. Indeed, parental reports of the use of social control typically decline as adolescents age (Keijsers & Poulin, 2013). Furthermore, as adolescents grow older, parents may begin to relax certain health behavior "rules" as they grant greater autonomy to their adolescents.

To compensate for the reduction in social control efforts, however, parents may turn to influence strategies that do not infringe on their adolescent's autonomy as directly, such as the use of intentional modeling of positive health behaviors. To date, few if any, studies have directly examined the effect of age on influence strategy use, with most

prior studies eliminating age as a factor by either limiting the age of the sample (Ellis et al., 2014) or statistically controlling for it (Ma & Hample, 2018). There also has been limited consideration of whether or how gender and age might interact to affect the type of influence that parents tend to use. For example, given prior research indicating that parents (especially mothers, e.g. Francis & Birch, 2005) are highly attuned to their daughter's health and weight, as their adolescent's age, parents may be less likely to reduce their use of social control with their daughters than their sons.

The present study

The Family Life, Activity, Sun, Health, and Eating (FLASHE) study is a large, cross-sectional, dyadic dataset involving parents and one of their adolescent children between the ages of 12 and 17. FLASHE contains measures of the influence tactics parents report using on their adolescents to change their behavior within four behaviors: fruits and vegetable consumption (FV), junk food and sugar-sweetened beverage consumption (JF), physical activity (PA), and screen time (ST). Past research utilizing the FLASHE dataset has examined how parenting styles are associated with parents' use of influence tactics and adolescent health behaviors (Zhang et al., 2019), the association between parents' use of controlling influence and adolescents' diet (Fleary & Ettienne, 2019), and the association between parents' use of intentional modeling and adolescents' diet (Ma & Hample, 2018). However, no one has examined the degree to which parent and adolescent gender and adolescent age are associated with the frequency with which parents use intentional modeling and/or social control. The size and scope of the FLASHE data set provides a unique opportunity to examine these issues and test the following hypotheses regarding the use of social control and intentional modeling.

For social control, we hypothesized that this form of influence would be used less frequently by parents who have older adolescents of either gender. We also hypothesized that there would be an interaction between adolescents' age and their gender, revealing a steeper decline in parental use of social control for sons than for daughters. For intentional modeling, we hypothesized that parents who have older adolescents would use this form of influence more frequently, and this would be true for both sons and daughters. For the initial round of analyses with mothers, we did not expect any differences in the use of intentional modeling by adolescents' gender. However, for the secondary round of analyses with fathers, given the results of the initial analyses, we expected to see fathers' use intentional modeling more with their sons than their daughters. Although our initial approach examined the tendencies of mothers and fathers separately, in response to guidance during the review process, we included parent gender as a variable in our analyses and tested our hypotheses on the full sample of mothers and fathers. The combined sample models are reported in this paper.

Because FLASHE has data on four health behaviors (FV, JF, PA, ST), we examined these hypotheses for each domain. We had no a priori hypotheses regarding variability in the observed patterns of influence use across the four health behaviors since there are a variety of ways to aggregate different domains (e.g., limiting vs. promoting behaviors, eating vs. activity related behaviors) and no single way was most theoretically relevant to

the current work. Examining the various behaviors separately allows our results to be of use to researchers who are interested not in how social control or intentional modeling operate broadly as they relate to health behavior, but as they relate to specific behaviors such as physical activity or junk food consumption.

Method

Pre-registration

The complete study protocol was pre-registered prior to accessing the FLASHE data. Because more than 70% of the parents in the FLASHE dataset were mothers, the initial pre-registration described analyzing the data from mother-adolescent dyads only. However, once the data from mother-adolescent dyads were examined, we decided there was a sufficient number of fathers for analysis. A second protocol was preregistered focusing on data for father-adolescent dyads. Ultimately, the analysis plan was altered during the review process to include both mothers and fathers in the same models, as well as to include path analytic models to complement the regression analyses conducted separately for each behavior. Both original pre-registrations, as well as the analysis code ultimately used, can be accessed on Open Science Framework (<https://osf.io/k83am/>).

Procedure

The FLASHE sample was collected by Ipsos Consumer Opinion Panel across the United States in 2014 (Nebeling et al., 2017; Oh et al., 2017). The sample was non-randomly selected and recruited to be representative of the U.S population on key demographic characteristics including income, sex, age, household size, and region. To be eligible, a parent had to live with at least one adolescent for 50% or more of the time. If the parent had more than one adolescent between the ages of 12 to 17 in the household, then one adolescent was randomly selected to participate with the parent. Respondents (each parent and their adolescent child) completed a survey inquiring about the adolescent's physical activity and diet, their relationship with their parent, and the amount of influence their parents typically exerted on their physical activity and diet behaviors. The general focus of the FLASHE study was on parents' and adolescents' diet and physical activity behaviors.

Participants

To be included in these analyses, both members of each dyad had to complete all relevant measures, including the adolescent's age and the gender of both the parent and adolescent. Given this constraint, the FLASHE sample contains 1655 dyads, representing both mother-adolescent dyads ($N = 1230$) and father-adolescent dyads ($N = 425$), all from different families. See Table 1 for sample descriptive statistics. Two hundred and four dyads were not included in these analyses because they did not meet the aforementioned inclusion criteria (see Table S1 in the supplemental materials for complete demographic information on the dropped dyads).

Measures

Parent/adolescent gender. Each parent and adolescent were asked to report their gender as either male or female. Based on this information, sons and fathers were coded as 1 and daughters and mothers were coded as -1 for the analyses.

Adolescent age. Each adolescent was asked to report their age from a list of options ranging from 12-years-old to 17-years-old. Adolescents' age was treated as a continuous variable.

Health behaviors. Parental influence was assessed for each of four health behaviors. Specifically, questions assessed the degree to which parents indicated that they attempted to increase their adolescent's physical activity (PA), decrease their adolescent's screen time (ST), increase their adolescent's fruit and vegetable consumption (FV), and decrease their adolescent's junk food consumption (JF). Within each behavioral domain, two forms of influence were assessed using the following measures.

Social control. Parents reported their use of social control to influence their adolescent for each of the four health behaviors. A single item for each health behavior asked parents to rate their agreement with the statement on a scale of 1 (*strongly disagree*) to 5 (*strongly agree*). These items included, "I make my teenager exercise or go out and play" (PA), "I decide how much screen time my teenager can have" (ST), "I make my teenager eat fruits and vegetables" (FV), and "I decide how much junk food or sugary drinks my teenager can have" (JF).

Intentional modeling. Parents also reported their use of intentional modeling for each of the four health behaviors. A single item for each health behavior asked parents to rate their agreement with the statement on a scale of 1 (*strongly disagree*) to 5 (*strongly agree*). These items included, "I try to be physically active when my teenager is around" (PA), "I try to limit my own screen time when my teenager is around" (ST), "I try to eat fruits and vegetables when my teenager is around" (FV), and "I try to avoid eating junk food or drinking sugary drinks when my teenager is around" (JF).

Data analytic method

Linear regression models were conducted to examine associations between adolescents' age and adolescents' and parents' gender for each type of parental influence (social control and intentional modeling) predicting each of the four health behaviors (physical activity, screen time, fruits and vegetable consumption, and junk food consumption). One set of models was run to examine social control for each of the four behaviors, and another set was run to examine intentional modeling for each of the four behaviors. To complement this approach, we also examined the robustness of our hypotheses within a path analytic framework that accounted for shared variance in reports of strategy use across the four health behaviors. These models contained the same set of predictors but accounted for the covariance between the outcome measures across the four health behavior domains.

Table 2. Sample descriptives and correlations for use of social control and intentional modeling across each health behavior domain separately for mothers and fathers.

		M	SD	Correlation Coefficients			
Mothers (N = 1230)				FV	JF	PA	ST
Social Control	FV	3.40	1.28	—	—	—	—
	JF	3.46	1.16	0.47	—	—	—
	PA	3.06	1.32	0.38	0.38	—	—
	ST	3.25	1.27	0.34	0.53	0.43	—
Intentional Modeling	FV	4.18	0.95	—	—	—	—
	JF	3.21	1.22	0.34	—	—	—
	PA	3.43	1.13	0.38	0.32	—	—
	ST	3.00	1.26	0.31	0.30	0.43	—
Fathers (N = 425)				F&V	JF	PA	ST
Social Control	FV	3.27	1.25	—	—	—	—
	JF	3.36	1.16	0.49	—	—	—
	PA	3.09	1.27	0.38	0.41	—	—
	ST	3.26	1.19	0.40	0.48	0.47	—
Intentional Modeling	FV	4.09	0.95	—	—	—	—
	JF	3.16	1.25	0.42	—	—	—
	PA	3.51	1.07	0.44	0.29	—	—
	ST	2.98	1.23	0.25	0.41	0.35	—

Note: FV = fruit & vegetable consumption; JF = junk food consumption; PA = physical activity; ST = screen time. All scales range from 1 to 5.

Results

Descriptive statistics: Use of social control and intentional modeling

Mean levels of reports of use for both social control and intentional modeling were consistent across mothers and fathers, with controlling influence endorsed more strongly for junk food consumption and less strongly for physical activity. Modeling influence use, on the other hand, was reported more for fruit and vegetable consumption and less for screen time. Mean levels of influence strategy use were relatively similar for social control and intentional modeling across all four health behaviors, with one exception. Both mothers and fathers reported higher levels of intentional modeling for fruit and vegetable consumption. See Table 2 for relevant descriptives and correlations for measures of influence use.

Patterns of influence use for each behavior: Social control

For each of the four health behaviors, we examined the degree to which parents' use of social control varied depending on their gender and their adolescent's age and gender. All four models are summarized in Table 3. Across all four behavioral domains, there was a significant main effect of adolescents' age on their parent's reports of using social control, such that parents of older adolescents reported less social control than did

Table 3. Models of parent-reported use of social control and intentional modeling predicted by parents' gender, adolescents' gender, adolescents' age, and the interactions of all three predictors, separately for each health behavior.

Influence Type	Predictor	Health Behavior							
		FV		JF		PA		ST	
		b	95% CI	b	95% CI	b	95% CI	b	95% CI
Social Control	(Intercept)	3.33	[3.26, 3.40]	3.42	[3.35, 3.48]	3.07	[3.00, 3.14]	3.25	[3.19, 3.32]
	Parent's gender	-0.07	[-0.14, 0.00]*	-0.05	[-0.12, 0.01]	0.01	[-0.06, 0.08]	-0.01	[-0.07, 0.06]
	Adolescent's gender	0.08	[0.01, 0.15]*	0.08	[0.02, 0.15]*	0.11	[0.04, 0.18]**	0.09	[0.02, 0.15]*
	Adolescent's age	-0.23	[-0.30, -0.16]**	-0.29	[-0.36, -0.23]**	-0.30	[-0.37, -0.23]**	-0.37	[-0.44, -0.30]**
	Parent's gender × Adolescent's gender	0.01	[-0.06, 0.08]	0.01	[-0.06, 0.07]	0.08	[0.01, 0.15]*	0.01	[-0.06, 0.07]
Intentional Modeling	Parent's gender × Adolescent's age	-0.06	[-0.13, 0.01]	-0.02	[-0.08, 0.05]	0.03	[-0.05, 0.10]	-0.01	[-0.07, 0.06]
	Adolescent's gender × Adolescent's age	-0.02	[-0.10, 0.05]	0.04	[-0.02, 0.10]	-0.01	[-0.08, 0.06]	-0.04	[-0.10, 0.03]
	Parent's gender × Adolescent's gender × Adolescent's age	0.04	[-0.03, 0.11]	0.07	[0.00, 0.13]*	0.10	[0.03, 0.18]**	0.03	[-0.04, 0.10]
	(Intercept)	4.14	[4.08, 4.19]	3.18	[3.11, 3.24]	3.47	[3.41, 3.53]	2.99	[2.92, 3.06]
	Parent's gender	-0.04	[-0.10, 0.01]	-0.03	[-0.10, 0.04]	0.04	[-0.02, 0.10]	-0.02	[-0.09, 0.05]
Social Control	Adolescent's gender	-0.01	[-0.06, 0.04]	0.03	[-0.03, 0.10]	-0.02	[-0.08, 0.05]	0.01	[-0.06, 0.08]
	Adolescent's age	-0.03	[-0.09, 0.02]	-0.07	[-0.14, 0.00]*	-0.06	[-0.12, 0.01]	-0.12	[-0.19, -0.04]**
	Parent's gender × Adolescent's gender	0.03	[-0.03, 0.08]	0.11	[0.05, 0.18]**	0.05	[-0.02, 0.11]	0.06	[-0.01, 0.13]
	Parent's gender × Adolescent's age	0.00	[-0.06, 0.05]	-0.06	[-0.13, 0.01]	0.01	[-0.06, 0.07]	-0.02	[-0.09, 0.05]
	Adolescent's gender × Adolescent's age	-0.02	[-0.08, 0.03]	-0.02	[-0.09, 0.05]	-0.01	[-0.07, 0.05]	-0.04	[-0.11, 0.03]
Social Control	Parent's gender × Adolescent's gender × Adolescent's age	-0.03	[-0.08, 0.03]	-0.02	[-0.09, 0.05]	0.03	[-0.04, 0.09]	-0.02	[-0.09, 0.05]

Note. FV = fruit & vegetable consumption; JF = junk food consumption; PA = physical activity; ST = screen time.

* $p < .05$, ** $p < .01$.

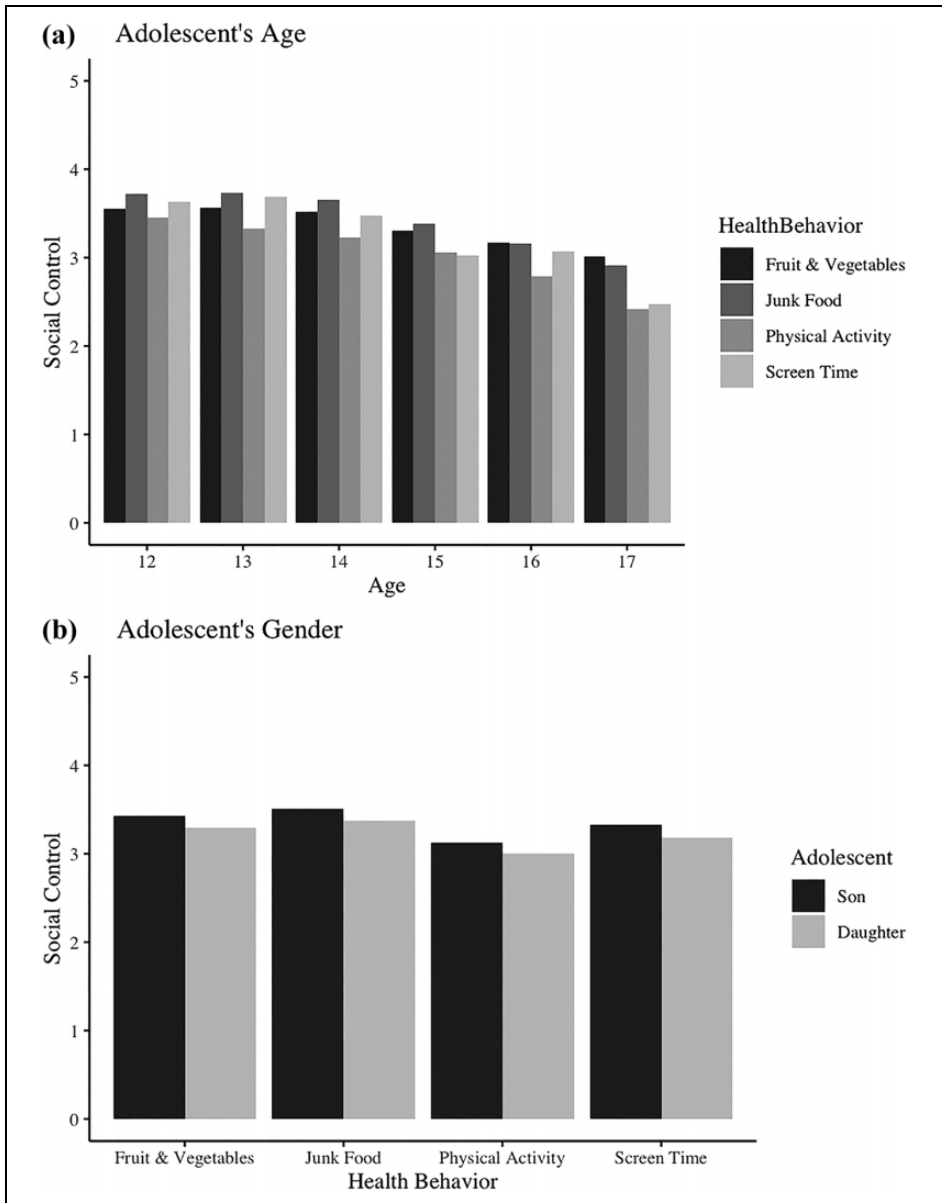


Figure 1. Parental reports of social control for four health behaviors (fruits and vegetable consumption; junk food consumption; physical activity; screen time) across adolescents of different (a) ages and (b) genders.

parents of younger adolescents (see Figure 1a). Furthermore, across all four behavioral domains, there was a significant main effect of adolescents' gender on their parent's reports of social control use, such that parents of sons reported using more social control

than parents of daughters (see Figure 1b). Finally, a main effect of parent gender emerged for the behavioral domain of fruit and vegetable consumption, such that mothers reported using more social control ($M_{FV} = 3.40$ (1.28)) in this domain than fathers did ($M_{FV} = 3.27$ (1.25)).

In the domain of physical activity, there was a significant interaction between parent and adolescent gender, which was further qualified by a significant 3-way interaction between parents' and their adolescent's gender and their adolescent's age (see Figure 2a). Specifically, both mothers and fathers of older adolescents reported using less social control, but the pattern differs based on the adolescent's gender in relation to their parent's gender. For mothers, there was a crossover pattern, such that mothers with younger sons reported using more social control. However, for older adolescents, mothers reported using social control more with their daughters than their sons. With respect to fathers, on the other hand, sons and daughters received similar rates of social control when they are young, but the use of social control by fathers was lower for older adolescents in general and especially for fathers with older daughters. In particular, fathers with young daughters reported using less social control for physical activity than did fathers with young sons.

A significant three-way interaction involving parent gender and adolescent gender and age also emerged for the behavioral domain of junk food consumption (see Figure 2b). Once again, although lower rates of social control are reported when an adolescent was older, the patterns differ based on the parent's and their adolescent's gender. Specifically, mothers reported using more social control with young sons than with young daughters. These levels, however, change with adolescents' age, such that by age 17 sons and daughters receive similar rates of social control. With respect to fathers, daughters receive similar levels of social control as sons regarding junk food consumption when they are younger, but when adolescents are older, fathers report using much less social control. Indeed, for adolescents at age 17, fathers of sons used social control for junk food consumption more than did fathers with daughters.

Patterns of influence use for each behavior: Intentional modeling

For each of the four health behaviors, we next examined the degree to which parents' use of intentional modeling varied depending on their gender and their adolescent's age and gender. All four models are summarized in Table 3. No significant effects emerged for the behavioral domains of fruit and vegetable consumption or physical activity. For the behavioral domains of junk food consumption and screen time, however, there was a main effect of adolescents' age, such that parents reported less intentional modeling for older adolescents, albeit at a lower rate than for social control (see Figure S1 for a description of the change in rates of intentional modeling across adolescent ages). Additionally, there was a significant two-way interaction between parent's gender and their adolescent's gender with respect to junk food consumption. Specifically, fathers reported more intentional modeling of junk food consumption with their sons ($M_{JF} = 3.30$ (1.21)) than with their daughters ($M_{JF} = 3.00$ (1.27)), whereas mothers reported the

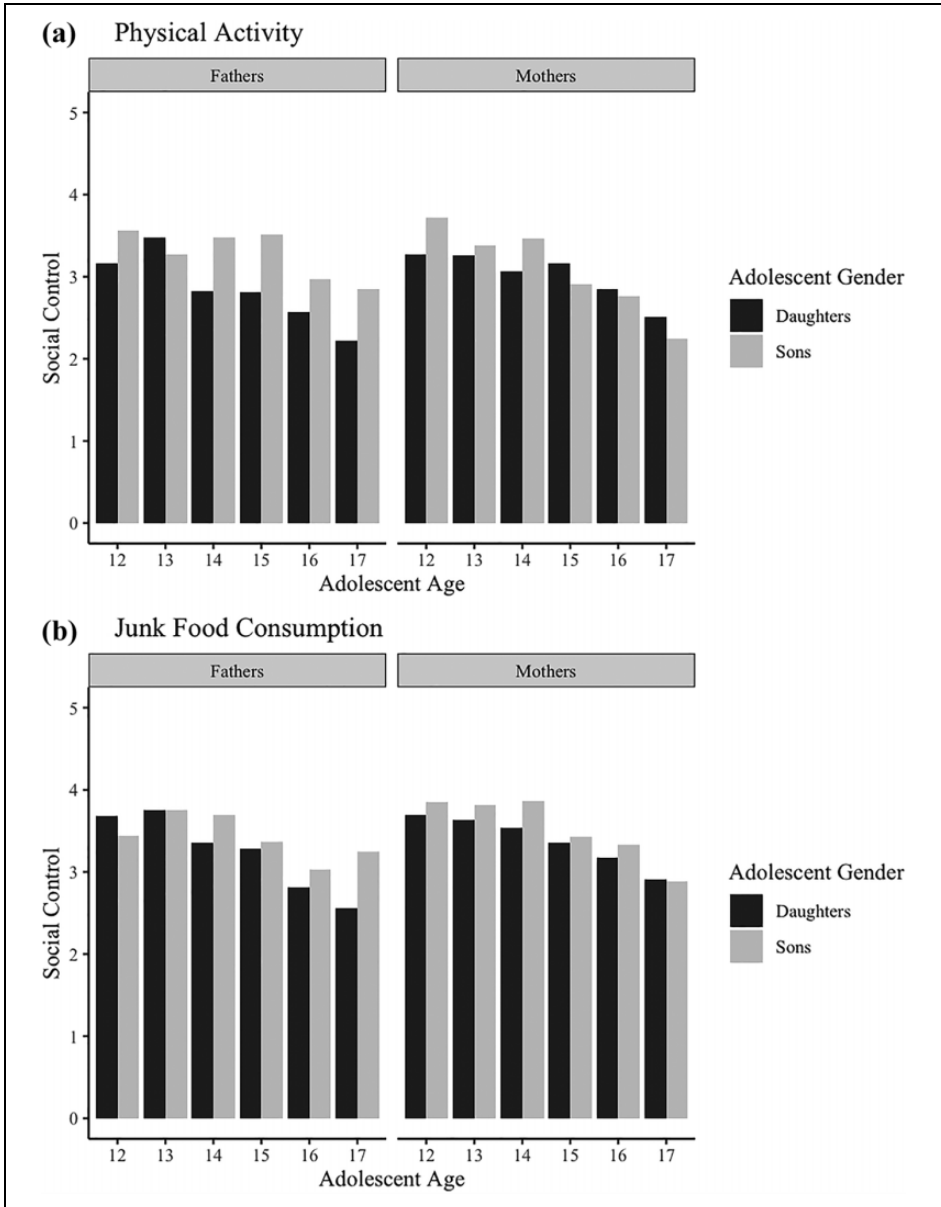


Figure 2. Parental reports of social control associated with parent gender and both adolescent age and gender for (a) physical activity and (b) junk food consumption.

opposite pattern (Daughters $M_{JF} = 3.28 (1.21)$ and Sons $M_{JF} = 3.12 (1.23)$). Although marginally significant, the interaction between the parent’s and their adolescent’s gender for intentional modeling of screen time showed a similar pattern.

Patterns of influence use across behaviors: Path analytic approach

To determine whether the patterns of influence use found in the regression analyses remained similar when the covariation in influence use across the four health behavior domains was taken into account, we conducted two path models—one for social control and one for intentional modeling. Even after accounting for the shared variance in reported influence use across all four health behaviors, all of the significant main effects and interactions that emerged for social control and intentional modeling in the regression analyses were still significant in the path analyses and of similar magnitude. The results for both models are summarized in Table 4. See the supplemental materials for the path diagram (Figure S2).

Discussion

These findings demonstrate that key demographic factors, which typically have been controlled for in prior studies, are meaningfully related to the influence strategies that parents enact on their adolescents to shape their health behavior. Although prior efforts to control for these characteristics indicate that investigators recognized the potential for variability in use of different influence strategies and tactics across age and gender, this assumption has received little empirical attention thus far. This might be attributable to limitations in the size or composition of available samples. The FLASHE sample presents a unique opportunity to examine patterns of influence strategy use by both mothers and fathers toward their adolescent sons and daughters.

As expected, parents' gender, as well as their adolescent's gender and age, were each associated with the type of influence strategies parents reported using. Consistent with past work (Keijsers & Poulin, 2013), parental reports of social control use declined across all four health behavior domains with the age of their adolescent. Results also revealed that overall levels of social control were consistently higher for parents of sons compared to parents of daughters. Furthermore, in the behavioral domains of physical activity and junk food consumption, parents' gender interacted with both their adolescent's gender and age to predict parents' use of social control. Though the specific patterns differed slightly depending on the level of social control reported for young adolescents, there was a steeper decline as adolescents aged in the use of social control by parents reporting on adolescents of the opposite gender (i.e., mothers reporting their use of social control with their sons, and fathers reporting their use of social control with their daughters). These patterns held, even when the shared variance between all four health behavior domains was accounted for.

Age and gender, however, had less of an effect on reported use of intentional modeling. In the behavioral domains of fruit and vegetable consumption and physical activity, mothers and fathers reported similar levels of intentional modeling with their sons and daughters, and their use of this strategy did not vary across adolescents' age. For the health behaviors of junk food consumption and screen time, parents' use of intentional modeling declined with adolescents' age, but to a smaller degree compared to the use of social control. In addition, there was a tendency for parents to use intentional modeling more frequently with same-gender adolescents (i.e., mothers with daughters

Table 4. Path coefficients from models of parent-reported use of social control and intentional modeling predicted by parents' gender, adolescents' gender, adolescents' age, and the interactions of all three predictors, across all health behaviors.

Influence Type	Predictor	Health Behavior											
		FV			JF			PA			ST		
		b	95% CI		b	95% CI		b	95% CI		b	95% CI	
Social Control	Parent's gender	-0.07	[-0.14, 0.00]*		-0.06	[-0.12, 0.01]		0.01	[-0.06, 0.08]		-0.01	[-0.08, 0.06]	
	Adolescent's gender	0.08	[0.01, 0.15]*		0.09	[0.02, 0.15]*		0.11	[0.04, 0.18]**		0.09	[0.02, 0.15]*	
	Adolescent's age	-0.22	[-0.30, -0.15]**		-0.30	[-0.37, -0.24]**		-0.30	[-0.37, -0.23]**		-0.38	[-0.45, -0.31]**	
	Parent's gender × Adolescent's gender	0.00	[-0.07, 0.07]		0.00	[-0.06, 0.06]		0.08	[0.01, 0.15]*		0.01	[-0.06, 0.08]	
Intentional Modeling	Parent's gender × Adolescent's age	-0.06	[-0.13, 0.01]		-0.01	[-0.08, 0.05]		0.03	[-0.05, 0.10]		-0.01	[-0.08, 0.05]	
	Adolescent's gender × Adolescent's age	-0.02	[-0.09, 0.05]		0.04	[-0.03, 0.10]		-0.01	[-0.08, 0.06]		-0.04	[-0.11, 0.03]	
	Parent's gender × Adolescent's gender × Adolescent's age	0.05	[-0.03, 0.12]		0.07	[0.00, 0.13]*		0.10	[0.03, 0.18]**		0.02	[-0.05, 0.09]	
	Adolescent's age × Adolescent's gender	-0.05	[-0.10, 0.01]		-0.03	[-0.10, 0.04]		0.04	[-0.02, 0.10]		-0.02	[-0.09, 0.05]	
Social Control	Parent's gender	-0.01	[-0.06, 0.04]		0.03	[-0.04, 0.10]		-0.01	[-0.08, 0.05]		0.01	[-0.06, 0.08]	
	Adolescent's gender	-0.03	[-0.09, 0.02]		-0.07	[-0.14, 0.01]*		-0.06	[-0.12, 0.01]		-0.12	[-0.19, -0.05]**	
	Adolescent's age	0.02	[-0.03, 0.08]		0.11	[0.04, 0.17]**		0.05	[-0.01, 0.11]		0.06	[-0.01, 0.13]	
	Parent's gender × Adolescent's age	0.00	[-0.06, 0.05]		-0.06	[-0.13, 0.01]		0.01	[-0.06, 0.07]		-0.03	[-0.10, 0.05]	
Intentional Modeling	Adolescent's gender × Adolescent's age	-0.02	[-0.08, 0.03]		-0.03	[-0.10, 0.04]		-0.01	[-0.08, 0.05]		-0.04	[-0.11, 0.03]	
	Parent's gender × Adolescent's gender × Adolescent's age	-0.03	[-0.08, 0.03]		-0.03	[-0.10, 0.04]		0.03	[-0.04, 0.09]		-0.02	[-0.09, 0.05]	
	Adolescent's age × Adolescent's gender												
	Adolescent's age × Adolescent's gender × Adolescent's age												

Note. FV = fruit & vegetable consumption; JF = junk food consumption; PA = physical activity; ST = screen time. **p* < .05. ***p* < .01.

and fathers with sons). Although only the interaction for intentional modeling of junk food consumption was statistically significant, the general pattern of these results is consistent with past research indicating that modeling tends to occur more within same-gender parent-child dyads (Schoeppe et al., 2016; Wertheim, 2002). Once again, these patterns held when the shared variance across all four health behavior domains was accounted for.

The results reveal how adolescent gender and age are associated with parents' reports of influence use. Why do these differences exist? There are a number of potential explanations. Certain influence strategies may be routinely used by parents because they tend to be more effective in changing adolescents' health-relevant behaviors. Some influence strategies, however, may be used based on what parents view as normative. For example, if a behavior is particularly threatening to an adolescent's long-term health (e.g., the adolescent is obese and is constantly eating junk food), the parent may feel it is more justifiable, based on normative parenting practices, to limit their child's behavior through the use of social control. On the other hand, particularly for older adolescents, norms related to the need for greater autonomy may outweigh health concerns, leading many parents to use intentional modeling out of respect for their adolescent's fledgling autonomy (Koepeke & Denissen, 2012). Societal norms around how acceptable it is to comment on or attempt to influence daughters' and sons' weight or health may also affect whether or how parents try to influence their adolescents. For example, parents may have greater concern about weight and appearance for daughters rather than sons, which might elicit more attempts at social control (Lipowska et al., 2018). Influence attempts may also have personal or relational costs (Frieze & McHugh, 1992), leading parents to weigh such costs and then utilize a strategy that minimizes costs to the parent-adolescent relationship. Future work should examine the relation between influence strategy use, influence effectiveness, and norms of influence use.

The FLASHE data set provided the opportunity to examine these patterns of influence across four behaviors that differed in both their domain (i.e., eating vs. activity) and their effect on health (i.e., health promoting vs. health damaging). Although we had no a priori reason to anticipate any particular pattern of influence use, some differences emerged. For example, parents' use of intentional modeling for health promoting behaviors (i.e., physical activity and fruit and vegetable consumption) did not vary as a function of adolescents' age and gender, whereas parents' use of intentional modeling did vary for health-damaging behaviors (i.e., screen time and junk food intake). There was some modest decline in intentional modeling for the behaviors that most parents likely want to minimize, and a tendency to model less with adolescents of a different gender in the first place. This suggests that parents may find it easier or have more opportunities to model engaging in behaviors than to model the absence of a behavior. A similar pattern was not found for the use of social control. Here the effects of adolescents' gender and age, when they emerged, were generally consistent across the four behaviors. This suggests that the norms guiding the use of social control may have less to do with the specific health behavior being targeted and more to do with developmental changes in the interactions between parents and their adolescent children (Keijsers & Poulin, 2013). Given the exploratory status of these comparisons, future work should examine these possible distinctions further.

The present study has some limitations. Because the FLASHE data set is cross-sectional, we had to rely on between-person analyses to examine questions, especially those regarding age, that ideally would be assessed longitudinally and within-person. Furthermore, even though this data set has a large number of fathers ($N = 425$), the sample of fathers is about one-third the size of the sample of mothers ($N = 1230$). In addition, the use of influence strategies was assessed with single-items answered on five-point scales, limiting the sensitivity and variation that could be captured. This was particularly true for the intentional modeling of fruit and vegetable consumption, which revealed a ceiling effect. Finally, our measure of gender was binary, which is unlikely to capture the full extent of variation underlying gender identity and role orientation (Magliozzi et al., 2016).

Though not a limitation, we focused on reports of intentional modeling in this study (i.e., parents' reports of consciously engaging in a given health behavior in front of their adolescents). Many prior studies have focused on more general behavioral modeling, which often includes unintentional modeling (e.g., Brown & Ogden, 2004). This difference may limit comparisons between the current findings and prior work that frequently has assessed both intentional and unintentional forms of modeling in the same measure. Moreover, just as modeling behavior can be conceptualized in different ways, our assessment of social control is limited by how it was assessed in the FLASHE study. Because different forms of social control exist, interpretations of the social control items by parents may have differed in ways that we could not discern in our analyses. For instance, a parent who makes their teenager exercise or go out and play regularly may do so in any number of different ways, ranging from restricting access to electronic devices until enough physical activity has occurred to signing their teenager up for a sport and driving them to practice. Finally, the present study did not assess whether or the degree to which the influence strategies that parents reported using were effective. Future work should examine the actual effectiveness of different strategies in samples that differ in age and gender, addressing whether the effectiveness of different influence strategies differs across these variables.


Additionally, one aspect of the FLASHE dataset we did not take advantage of is the racial diversity of the sample. Little work has investigated whether or how social control and/or modeling influence differ as a function of race. Given that social inequality and racial discrimination pose additional health concerns for children of color (Sander-Phillips et al., 2009), future work should take advantage of FLASHE's sample to examine this issue.


In conclusion, demographic variables such as age and gender have frequently been controlled in most prior studies of parental influence via statistical or methodological techniques. The present study illustrates how studies with large samples can provide an opportunity to examine whether social influence strategies are used differentially depending on the age and gender of the parent and child. Capitalizing on the size and scope of the FLASHE sample, we were able to compare how mothers and fathers use two different influence strategies with their adolescent sons and daughters as they work to shape their adolescents' behavior across four different domains. This work illustrates the importance of describing both the similarities and differences in how mothers and fathers use influence strategies to shape the health behavior of their adolescent sons and daughters.

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Open research statement

As part of IARR's encouragement of open research practices, the authors have provided the following information: This research was pre-registered. The aspects of the research that were pre-registered were the variables of interest, hypotheses, and analysis plans. The registration was submitted to the Open Science Framework (<https://osf.io/k83am/>). The data used in the research are publicly posted. The data and associated code books can be obtained at: <https://cancercontrol.cancer.gov/brp/hbrb/flashe-terms.aspx>. The materials used in the research can be publicly posted. The materials can be obtained at: <https://osf.io/k83am/> or by emailing: jaege272@umn.edu.

Supplemental material

Supplemental material for this article is available online.

References

- Alderman, B. L., Benham-Deal, T. B., & Jenkins, J. M. (2010). Change in parental influence on children's physical activity over time. *Journal of Physical Activity & Health, 7*, 60–67. <https://doi.org/10.1123/jpah.7.1.60>
- Arroyo, A., Segron, C., & Andersen, K. K. (2017). Intergenerational transmission of discordant eating: Direct and indirect maternal communication among grandmothers, mothers, and daughters. *Body Image, 20*, 107–115. <https://doi.org/10.1016/j.bodyim.2017.01.001>
- Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Prentice-Hall.
- Bleakley, A., Piotrowski, J. T., Hennessy, M., & Jordan, A. (2013). Predictors of parents' intention to limit children's television viewing. *Journal of Public Health, 35*, 525–532. <https://doi.org/10.1093/pubmed/fds104>
- Brown, R., & Ogden, J. (2004). Children's eating attitudes and behaviour: A study of the modeling and control theories of parental influence. *Health Education Research, 19*, 261–271. <https://doi.org/10.1093/her/cyg040>
- Cialdini, R. B., & Griskevicius, V. (2010). Social influence. In R. F. Baumeister & E. J. Finkel (Eds.), *Advanced social psychology: The state of the science* (pp. 385–417). Oxford University Press.
- Edwardson, C. L., & Gorely, T. (2010). Parental influences on different types and intensities of physical activity in youth: A systematic review. *Psychology of Sport and Exercise, 11*, 522–535. <https://doi.org/10.1016/j.psychsport.2010.05.001>

- Ellis, K. R., Caldwell, C. H., Assari, S., & De Loney, E. H. (2014). Nonresident African-American fathers' influence on sons' exercise intentions in the fathers and sons program. *American Journal of Health Promotion, 29*, 89–98. <https://doi.org/10.4278/ajhp.130417-QUAN-179>
- Ennett, S. T., Bauman, K. E., Foshee, V. A., Pemberton, M., & Hicks, K. A. (2001). Parent-child communication about adolescent tobacco and alcohol use: What do parents say and does it affect youth behavior? *Journal of Marriage and Family, 63*, 48–62. <https://doi.org/10.1111/j.1741-3737.2001.00048.x>
- Fleary, S. A., & Ettienne, R. (2019). The relationship between food parenting practices, parental diet and their adolescents' diet. *Appetite, 135*, 79–85. <https://doi.org/10.1016/j.appet.2019.01.008>
- Francis, L. A., & Birch, L. L. (2005). Maternal influences on daughters' restrained eating behavior. *Health Psychology, 24*, 548–554. <https://doi.org/10.1037/0278-6133.24.6.548>
- Frieze, I. H., & McHugh, M. C. (1992). Power and influence strategies in violent and nonviolent marriages. *Psychology of Women Quarterly, 16*, 449–465. <https://doi.org/10.1111/j.1471-6402.1992.tb00268.x>
- Garriguet, D., Colley, R., & Bushnik, T. (2017). Parent-child association in physical activity and sedentary behaviour. *Health Reports, 28*, 3–11.
- Hochgraf, A. K., McHale, S. M., & Fosco, G. M. (2019). Interparental conflict and gender moderate the prospective link between parents' perceptions of adolescents' weight and weight concerns. *The International Journal of Eating Disorders, 52*, 904–913. <https://doi.org/10.1002/eat.23093>
- Keijsers, L., & Poulin, F. (2013). Developmental changes in parent–child communication throughout adolescence. *Developmental Psychology, 49*, 2301–2308. <https://doi.org/10.1037/a0032217>
- Koepke, S., & Denissen, J. A. (2012). Dynamics of identity development and separation–individuation in parent–child relationships during adolescence and emerging adulthood: A conceptual integration. *Developmental Review, 32*, 67–88. <https://doi.org/10.1016/j.dr.2012.01.001>
- Lewis, M. A., & Rook, K. S. (1999). Social control in personal relationships: Impact on health behaviors and psychological distress. *Health Psychology, 18*, 63–71. <https://doi.org/10.1037/0278-6133.18.1.63>
- Lipowska, M., Lipowski, M., Jurek, P., Jankowska, A. M., & Pawlicka, P. (2018). Gender and body-fat status as predictors of parental feeding styles and children's nutritional knowledge, eating habits and behaviors. *International Journal of Environmental Research and Public Health, 15*, 852–868. <https://doi.org/10.3390/ijerph15050852>
- Ma, Z., & Hample, D. (2018). Modeling parental influence on teenagers' food consumption: An analysis using the family life, activity, sun, health, and eating (FLASHE) survey. *Journal of Nutrition Education and Behavior, 50*, 1005–1014. <https://doi.org/10.1016/j.jneb.2018.07.005>
- Magliozzi, D., Saperstein, A., & Westbrook, L. (2016). Scaling up: Representing gender diversity in survey research. *Socius, 2*, 1–11. <https://doi.org/10.1177/2378023116664352>
- Malina, R. M. (2001). Physical activity and fitness: Pathways from childhood to adulthood. *American Journal of Human Biology, 13*, 162–172. [https://doi.org/10.1002/1520-300\(200102/03\)13:2<162::AID-AJHB1025>3.0.CO;2-T](https://doi.org/10.1002/1520-300(200102/03)13:2<162::AID-AJHB1025>3.0.CO;2-T)
- Nebeling, L. C., Hennessy, E., Oh, A. Y., Dwyer, L. A., Patrick, H., Blanck, H. M., & Yaroch, A. L. (2017). The FLASHE study—survey development, dyadic perspectives, and participant characteristics. *American Journal of Preventive Medicine, 52*, 839–848. <https://doi.org/10.1016/j.amepre.2017.01.028>

- Oh, A. Y., Davis, T., Dwyer, L. A., Hennessy, E., Li, T., Yaroch, A. L., & Nebeling, L. C. (2017). Recruitment, enrollment, and response of parent–adolescent dyads in the FLASHE study. *American Journal of Preventive Medicine*, *52*, 849–855. <https://doi.org/10.1016/j.amepre.2016.11.028>
- Sanders-Phillips, K., Settles-Reaves, B., Walker, D., & Brownlow, J. (2009). Social inequality and racial discrimination: Risk factors for health disparities in children of color. *Pediatrics*, *124*, S176–S186. <https://doi.org/10.1542/peds.2009-1100E>
- Schoeppe, S., Röbl, M., Liersch, S., Krauth, C., & Walter, U. (2016). Mothers and fathers both matter: The positive influence of parental physical activity modeling on children’s leisure-time physical activity. *Pediatric Exercise Science*, *28*, 466–472. <http://dx.doi.org/10.1123/pes.2015-0236>
- Simons-Morton, B., & Chen, R. (2005). Latent growth curve analyses of parent influences on drinking progression among early adolescents. *Journal of Studies on Alcohol*, *66*, 5–13. <https://doi.org/10.15288/jsa.2005.66.5>
- Slatcher, R. B., & Selcuk, E. (2017). A social psychological perspective on the links between close relationships and health. *Current Directions in Psychological Science*, *26*, 16–21. <https://doi.org/10.1177/0963721416667444>
- Umberson, D., Crosnow, R., & Reczek, C. (2010). Social relationships and health behavior across the life course. *Annual Review of Sociology*, *36*, 139–157. <https://doi.org/10.1146/annurev-soc-070308-120011>
- Wertheim, E. H. (2002). Parent influences in the transmission of eating and weight related values and behaviors. *Eating Disorders*, *10*, 321–334. <https://doi.org/10.1080/10640260214507>
- Wertheim, E. H., Mee, V., & Paxton, S. J. (1999). Relationships among adolescent girls’ eating behaviors and their parents’ weight-related attitudes and behaviors. *Sex Roles*, *41*, 169–187. <https://doi.org/10.1023/A:1018850111450>
- Yao, C. A., & Rhodes, R. E. (2015). Parental correlates in child and adolescent physical activity: A meta-analysis. *International Journal of Behavioral Nutrition and Physical Activity*, *12*, 10–48. <https://doi.org/10.1186/s12966-015-0163-y>
- Yee, A. Z. H., Lwin, M. O., & Ho, S. S. (2017). The influence of parental practices on child promotive and preventative food consumption behaviors: A systematic review and meta-analysis. *International Journal of Behavioral Nutrition and Physical Activity*, *14*, 1–14. <https://doi.org/10.1186/s12966-017-0501-3>
- Zhang, Y., Davey, C., Larson, N., & Reicks, M. (2019). Influence of parenting styles in the context of adolescents’ energy balance-related behaviors: Findings from the FLASHE study. *Appetite*, *142*, 1–10. <https://doi.org/10.1016/j.appet.2019.104364>