Parental Involvement and Adolescents' Academic Achievement: Latent Profiles of Mother and Father Warmth as a Moderating Influence

GERARD CHUNG* iD
JONATHAN PHILLIPS*
TODD M. JENSEN*,†
PAUL LANIER*

Parental involvement in their adolescents' education plays an important role in promoting their children's academic outcomes. Yet, more research is needed to examine the relationship between parenting practices and parental warmth as well as to consider the potential joint contribution of warmth from both fathers and mothers. Thus, the primary purpose of the current study is to examine the extent to which patterns of parental warmth across fathers and mothers moderate the association between parental involvement and adolescents' grade point average (GPA) and school engagement behaviors. Latent profile analysis was conducted to identify disparate profiles of fathers' and mothers' warmth within a nationally representative sample of 2,306 youths (51% male; mean age = 15.31 years, SD *= 1.50; 77% non-Hispanic White) residing in opposite-sex, two-parent families from Wave I and II of the National Longitudinal Study of Adolescent to Adult Health. Latent-class enumeration processes support a five-profile solution characterized by differences in levels of parental warmth and congruency across parents: (a) Congruent High Warmth, (b) Congruent Moderate Warmth, (c) Congruent Low Warmth, (d) Incongruent High Mother/Low Father Warmth, and (e) Incongruent Low Father/Lower Mother Warmth. Subsequent multiple linear regression analyses reveal a moderating effect for Congruent Low Warmth on the relationship between parental involvement and adolescents' GPA. Ultimately, the results show that variation in parental warmth exists across fathers and mothers with differing impact on adolescents' outcomes. Excluding one parent without considering the joint effects of both parents will not produce an accurate and precise understanding of parenting in research or practice.*

Keywords: Family Processes; Youth; Academic Achievement; School Engagement; Parental Warmth; Fathers

*School of Social Work, University of North Carolina at Chapel Hill, Chapel Hill, NC.
†Jordan Institute for Families, Chapel Hill, NC.
Correspondence concerning this article should be addressed to Gerard Chung, School of Social Work, University of North Carolina at Chapel Hill, 325 Pittsboro Street CB# 3550, Chapel Hill, NC 27599. E-mail: gcsk1982@live.unc.edu.

Academic achievement among adolescents has been linked to positive peer and parental relationships, emotional well-being, and social mobility later in life (Hill & Tyson, 2009; Johnson, Brett, & Deary, 2010; Wang & Sheikh-Khalil, 2014). Conversely, a lack of academic success can have negative impacts on adolescents, families, and the communities where they reside (Murray, 2009). Today more than ever, high school graduation has become a social expectation as well as a prerequisite for success in the current marketplace (Fredricks, Blumenfeld, & Paris, 2004). School engagement has become a prominent predictor of academic achievements in the literature as nearly half of all high school dropouts report being bored and uninterested in classes and 69% report being unmotivated to work hard (Bridgeland, DiIulio, & Morison, 2006). The literature has continued to point to the important role of parents in promoting their adolescents' grade point average (GPA) and school engagement (Hill & Wang, 2015). Thus, this study examined the interplay between parents' involvement in their children's education and the joint influence of parental warmth across fathers and mothers in influencing their children's achievements in GPA and school engagement.

Parental Home-based Involvement and Academic Outcomes

Parents' involvement in their children's education is a multifaceted construct that includes school-based involvement and home-based involvement (Wang & Sheikh-Khalil, 2014). A large body of studies supports the importance of parental home-based involvement for students' academic success (Gordon & Cui, 2012; Hill & Tyson, 2009; Spera, 2006; Wang & Sheikh-Khalil, 2014; Wilder, 2016). For instance, Gordon and Cui (2012) analyzed data from a national representative sample of adolescents in the United States and found that home-based involvement—defined as parents assisting their children with their homework and projects, talking to them about school life and their school performance—was positively associated with adolescents' GPA. Two perspectives have been used to explain the link between parents' home-based involvement and their children's academic achievements. From a skill development perspective, parents' practices such as monitoring school work can be opportunities for coaching that can boost their children's learning abilities (Pomerantz, Moorman, & Litwack, 2007). From a motivational development perspective, parents' practices such as highlighting the value of school increase their children's academic motivation, which improves school engagement and academic grades (Pomerantz et al., 2007).

Parental Warmth and the Integrative Model of Parenting

What is, however, not well-studied and understood in the literature is the relationship between parenting practices and the parenting style of parents. Parenting practices (e.g., home-based involvement in child's education), which are domain-specific, do not happen in isolation but occur in the emotional context of a parent–child relationship (Darling & Steinberg, 1993). The Integrative Model of Parenting (Darling & Steinberg, 1993) differentiates between parenting practices and parental style and suggests that the effects of domain-specific parenting practices depend on the relationship between parents and their children. Indeed, "how parents express their involvement and encouragement may be as important as whether and to what extent they do" (Steinberg, Lamborn, Dornbusch, & Darling, 1992, p. 1279). Thus, the Integrative Model of Parenting suggests that parental style can moderate the influence of parenting practices on youth outcomes (Lowe & Dotterer, 2013).

In this study, we choose to focus on parental warmth as the parenting style of interest. Parental warmth is the quality of the affectional bond that parents have with their children and parental behaviors marked by warmth can convey support, affection,

responsiveness, and care to their child (Rohner, Khaleque, & Cournoyer, 2005). The general benefits of parental warmth are strongly supported by a wide body of studies (Khaleque, 2013; Rohner et al., 2005). For one, a meta-analysis of 30 studies conducted found that parental warmth was positively related to their children's psychological adjustment and personality disposition (Khaleque, 2013). Parental warmth might also be directly associated with academic outcomes because an affectional parent–child bond provides adolescents with a high level of emotional security, giving them a sense of comfort and support that aids their success in school (Rohner et al., 2005). In addition, adolescents who perceive their parents as warm toward them are more likely to develop positive beliefs about education and stronger motivation to do well academically (Steinberg et al., 1992). They are also more likely to engage in bidirectional communication with their parents, leading to better interpersonal skills that foster better social engagement in schools (Spera, 2005).

As shown, most studies have looked at the main effects of parental warmth and parents' home-based involvement on their adolescents' academic outcomes (e.g., Gordon & Cui, 2012; Kay, Shane, & Heckhausen, 2016). Consistent with the Integrative Model of Parenting, there remain important opportunities to assess interactional effects between parental warmth and parents' home-based involvement on adolescents' academic outcomes. At least two extant studies illustrate the utility of this approach. For one, Spera (2006) found that parental warmth and demandingness moderated the relationship between parents' home-based involvement and their 7th- to 8th-grade youths' school grades. In addition, Lowe and Dotterer (2013) found among a sample of 6th- to 8th-grade youths that higher levels of maternal warmth strengthened the relationship between parental monitoring and their children's engagement in school.

Joint Influence of Father and Mother Warmth

Although the work of Lowe and Dotterer (2013), Spera (2006), and others such as Steinberg et al. (1992) have made crucial contributions to understanding the dynamic interplay between parental involvement, parenting styles, and adolescents' academic outcomes, they did not distinguish between fathers and mothers' parenting and considered their joint influence. More often than not, existing research has exclusively focused on the mother–child relationship while fathers are excluded (Cabrera, Volling, & Barr, 2018). According to the Ecological Systems Theory, fathers are also significant figures in a child's microsystem and play an important role in enhancing their child's academic abilities and engagement in schools (Gordon, 2016). Some studies have shown that the nature and quality of mother–child and father–child relationships can differ; mother–child relationships are often characterized by more mutuality, closeness, and support relative to father–child relationships (Laible & Carlo, 2004).

A key opportunity for research in this area is to identify disparate patterns of both fathers' and mothers' parental warmth in families and examine the extent to which these patterns moderate the association between parental involvement and adolescents' academic outcomes. Drawing evidence mostly from studies focused on parents of young children, there are different views of how the warmth of fathers interplays with the warmth of mothers in influencing children's outcomes. One view is that the effects of fathers' and mothers' warmth may be multiplicative such that the impact on children is more than the sum of the effects (i.e., additive) related with each parent independently (Martin, Ryan, & Brooks-Gunn, 2007). For instance, two parents with high warmth may share similar parenting qualities that reinforce each parent's positive interactions with their children. When there are incongruent levels of warmth between parents (e.g., one parent has higher warmth and the other parent has lower warmth), the parent who is higher in warmth

may mitigate the effects of the lower warmth parent. Alternatively, the lower warmth parent may weaken the contributions of the higher warmth parent by undermining the higher warmth parent's ability to confer advantages onto the child (Martin, Ryan, & Brooks-Gunn, 2010). Despite limited evidence, we can surmise that children's outcomes will be optimized in the context of high levels of warmth across both mothers and fathers. In a study on first-grade children's externalizing behavior symptoms (Meteyer & Perry-Jenkins, 2009), families with two high warmth parents had children with the least number of behavioral problems; however, parents who were both low in warmth had children with the highest number of behavioral problems. Importantly, few existing studies attend to the combined influence of mothers and fathers, particularly among adolescent children. This is an important oversight, as a focus on the joint influence of mothers and fathers provides a more accurate assessment of adolescents' experiences in opposite-sex, two-parent families. Most studies on parenting have either aggregated measurements of both parents' warmth, exclude, or statistically control the influence of one parent to study the main effect of the other (Laible & Carlo, 2004). Due to the possibility that the "effects of one parent's pattern are in fact driven by the other's or by a synergistic dynamic created by a combination of the two" (Martin et al., 2007, p. 436), understanding the parenting patterns of both fathers and mothers and their joint effects would produce a more accurate understanding of the influences of parenting.

Although there are some studies that looked at the direct joint influence of both fathers' and mothers' parental warmth on adolescents' academic outcomes (Gordon, 2000), there are no extant studies that examined the moderating effect of patterns of both fathers' and mothers' parental warmth on the relationship between parental involvement and adolescents' academic outcomes. One study by Lowe and Dotterer (2013) found that mothers' warmth enhanced the relationship between parental monitoring and minority youths' engagement in school, whereas fathers' warmth strengthened the negative association between parental monitoring and school trouble; however, the study analyzed mothers' and fathers' warmth separately and did not consider the joint influence of both parents' warmth. Spera (2006) found using cross-sectional data collected from two schools in the United States that parental styles moderated the relationship between parents' involvement and their youths' school grades; however, they did not distinguish between mothers' and fathers' parenting. Furthermore, these studies did not use nationally representative samples or longitudinal data. In spite of their limitations, they indicate the potential for the moderating role of patterns of both fathers' and mothers' parental warmth.

To address gaps in the literature, the aims of our study are twofold. First, using latent profile analysis (LPA), we aim to identify disparate patterns of fathers' and mothers' warmth within a nationally representative sample of adolescents residing in opposite-sex, two-parent families. We then use longitudinal data to examine the extent to which patterns of parental warmth across both fathers and mothers moderate the association between parental involvement and adolescents' academic outcomes. Our aims are novel in that we (a) acknowledge the potential joint contribution of warmth from both fathers and mothers, and (b) disentangle parenting practices (i.e., parental involvement in their children's education) from parental style (i.e., parental warmth). Our attention to these nuances could have important implications for practitioners who seek to support families and promote adolescents' behavioral health and academic success.

METHODS

Data and Sample

Our study analyzed publicly available data from the Wave I and II in-home adolescent interviews and parent questionnaires from the National Longitudinal Study of Adolescent

to Adult Health (Add Health). Respondents were randomly selected from a nationally representative in-school sampling frame of adolescents and interviews were conducted in the homes. The interviews with the adolescents included questions about their relationships with family and school functioning. Data from the adolescents were recorded on laptop computers. For the parents, information about their marital relationships and socioeconomic characteristics was collected. Parent data were collected using interviewer-assisted, op-scanned questionnaires. In the publicly available dataset, approximately 6,500 adolescents in grades 7 through 12 during the 1994–1995 school year comprised the Wave I sample. In Wave II, approximately 4,800 adolescents were followed up from Wave I. These adolescents came from diverse family structures with the majority of adolescents in opposite-sex, two-biological parent families, followed by the second biggest group of adolescents residing in single-parent family structures. Given the nature of our study aims, we wanted to focus on a homogenous family structure. Thus, we focused on a sample of adolescents primarily residing in opposite-sex, two-biological parent married families. Although we acknowledge the importance of attending to other family structures, we believe our initial focus is warranted because the make-up and function of parent–child relationships can differ across family structures (Jensen, 2017, 2018).

The final sample included 2,306 adolescents (51% male, mean age = 15.31 years, SD = 1.50 years). About 77% of youth identified themselves as non-Hispanic White, 8% as non-Hispanic African Americans, 3% as non-Hispanic Asians, and 1% as Native Americans or others. The remaining 11% identified themselves as Hispanics. Average household annual income was $55,218 ($SD$ = 55,166). The modal level of mothers' education was high school graduation (34%) followed by college education or more (31%). The modal level of fathers' education was college education or more (44%), followed by high school graduation (26%).

Measures

Parental home-based involvement (Wave I)

Information about parents' home-based involvement was measured using three dichotomous items (see Gordon, 2016). Adolescents were asked to indicate (1 = *yes*, 0 = *no*) whether they had engaged with their father or mother in any of the following activities during the past 4 weeks: (a) talked about their school work or grades, (b) worked on a project for school, and (c) talked about things they were doing in school. These items captured only an understanding of whether an activity had occurred in the past 4 weeks; information about the quality or duration of the parents' involvement was not captured with these items (Jensen, 2018). Results of this study should then be understood within the limits of these items. We derived a composite measure of the total parents' involvement by a summation of the scores for fathers and mothers that can range from 0 to 6 (M = 2.39, SD = 1.85).

Parental warmth (Wave I)

Information about parents' warmth was measured using three ordinal-level items (see Gordon, 2016), which asked the adolescents the following: (a) how close do you feel to your mother, (b) how much do you think she cares about you (1 = *not at all* to 5 = *very much*), and (c) most of the time, your mother is warm and loving toward you (1 = *strongly agree* to 5 = *strongly disagree*, then reverse-coded). Similar items for fathers were asked. All three items were summed to obtain separate composite scores for fathers (M = 13.44, SD = 1.89) and mothers (M = 13.93, SD = 1.50) with possible range 3–15. Higher scores indicate higher parental warmth. Cronbach's alphas for this study were .71 (maternal warmth) and .77 (paternal warmth).

School engagement behaviors (Wave II)

Four ordinal-level items were used to measure the level of school engagement behaviors (see Langenkamp, 2016). Adolescents reported in the current school year how often they had trouble getting along with other students and teachers, getting their homework done, and paying attention in school (0 = *never* to 4 = *everyday*). Scores were reverse-coded so that higher scores indicated positive engagement. Items were then summed to generate a composite score with a possible range of 0 to 16 (*M* = 12.19, *SD* = 2.67). Cronbach's alpha for this study was .70.

GPA (Wave II)

The GPA for four school subjects (English, mathematics, history/social studies, and science) was measured on a 4-point scale (1 = *grade D or lower* to 4 = *grade A*). A composite score of school GPA was generated by taking the mean of grades received in all four school subjects in the current school year (*M* = 2.94, *SD* = 0.75). A higher score on this composite score indicated better overall academic achievement.

Covariates (Wave I)

Adolescent age was measured in years and gender was coded with "male" as the reference group. We reported the descriptive statistics for race and ethnicity using five levels: (a) non-Hispanic White, (b) non-Hispanic African American, (c) non-Hispanic Asians, (d) Native Americans/Others, and (e) Hispanics. For the analysis, due to the small numbers, we combined non-Hispanic African American, non-Hispanic Asians, and Native Americans/Others into one category "non-Hispanic non-Whites". Information on parent's education was reported according to four levels: (a) less than high school degree, (b) high school graduation/GED (reference group), (c) some college education, (d) college education or more. However, in our analysis, we used the highest education degree obtained by parents. Annual family income was the annual income that the family received in the current year and the income of everyone in the household. Parents reported on their level of happiness in their marital relationship on a 10-point Likert scale (1 = *completely unhappy* to 10 = *completely happy*).

Analytical Plan

First, LPA was used to identify profiles of fathers' and mothers' warmth using continuous indicators of parental warmth (Berlin, Williams, & Parra, 2014). A variety of latent profile solutions (i.e., 1–6 latent profiles) were estimated to identify the optimal or best-fitting solution. As recommended by Muthén and Muthén (2012), large sets of random starts were specified to avoid model solutions derived from local log-likelihood maxima, which can produce misleading or anomalous findings. The Bayesian information criterion (BIC) was used as an indicator of the relative fit across different profile solutions (Schwarz, 1978). Lower values of BIC indicate better relative model fit (Collins & Lanza, 2010). The Lo–Mendell–Rubin test (LMR) and the Bootstrap Likelihood Ratio Test (BLRT) were also examined to contrast the fit of neighboring profile solutions (i.e., comparing the k-profile model with the $k - 1$ profile model; Berlin et al., 2014; Lo, Mendell, & Rubin, 2001). *p*-Values from these two tests can be used to determine if there is a statistically significant improvement in fit for the inclusion of an additional profile. The sample size of the smallest profile was also evaluated since a small sample-size class (i.e., <1% and/or $n < 25$) may have less precision and low power (Berlin et al., 2014). Entropy and mean posterior probability values were also examined to assess the precision and classification certainty associated with each profile solution; values closer to 1 reflect better classification certainty (Nagin & Odgers, 2010; Nylund-Gibson & Masyn, 2016).

After identifying the optimal profile solution, multinomial logistic regression was used to test associations between latent profiles of parental warmth and a set of sociodemographic and substantive covariates (this serves as a form of construct validation for the latent profile solution). Then, multiple linear regression analyses were used to model (a) the main effect between parental involvement and adolescents' academic outcomes (i.e., school engagement behaviors and GPA), and (b) the moderating effect of latent profiles of parental warmth on the association between parental involvement and adolescents' outcomes. Two models were estimated—one for school engagement, and another for GPA as the outcome. Covariates were included in the models, and continuous predictors were mean-centered. Mplus 8.1 (LPA) and Stata 14.2 (multinomial logistic and multiple linear regression) software packages were used for the analyses. To derive representative model parameters, sampling weights were used in all the analyses (Chen & Chantala, 2014).

RESULTS

With respect to our first study aim, we evaluated several latent profile solutions to determine the optimal number of profiles of parental warmth. Table 1 shows results from the profile enumeration process. The BIC values decreased from one profile to six profiles, providing some evidence that a larger number of profiles yielded a better fit. The LMR test, however, was statistically insignificant ($p = .11$) when assessing the addition of the sixth profile, indicating that the five-profile solution might be preferable. Moreover, the six-profile solution produced one profile with a small sample size (i.e., $n = 30$; about 1% of the full sample), suggesting potential overextraction (Petras & Masyn, 2010) and vulnerability to low power and precision (Berlin et al., 2014). Taken together, the five-profile solution was selected as optimal.

The five-profile solution had an entropy value of .93 indicating strong classification certainty. The mean posterior probabilities values ranged from .90 to .98, indicating strong class separation (Asparouhov & Muthén, 2014). Since there was evidence of strong classification certainty as indicated by the entropy and mean posterior probability values, the three-step procedure was not used (Asparouhov & Muthén, 2014). Table 2 shows the average levels of father warmth and mother warmth across the five profiles, whereas Figure 1 visually plots the scores. The five profiles were distinguished as follows: (a) congruent high-level warmth across parents (*Congruent High Warmth*, $n = 1,642$, 71%); (b) congruent moderate-level warmth across parents (*Congruent Moderate Warmth*, $n = 398$, 17%);

TABLE 1
Model Fit and Class Enumeration

Classes	BIC	BLRT (*p*-values)	LMR (*p*-value)	Entropy	Smallest *n*	Mean posterior probabilities					
						1	2	3	4	5	6
1	17937.83	—	—	—	—	—					
2	16638.99	.00	.00	0.94	223	.99	.92				
3	16158.69	.00	.00	0.89	74	.94	.921	.98			
4	15732.84	.00	.00	0.91	69	.92	.97	.80	.98		
5	**15423.13**	**.00**	**.00**	**0.93**	**51**	**.90**	**.93**	**.93**	**.98**	**.97**	
6	15170.15	.00	.11	0.94	30	.88	.97	.93	1.00	.98	.92

Notes. BIC = Bayesian information criterion; BLRT = Bootstrap Likelihood Ratio Test; LMR = Vuong-Lo–Mendell–Rubin test.
Bold items correspond with the solution selected as optimal.

TABLE 2
Latent Profiles of Parental Warmth

	Entire sample (n = 2,306)		1 Congruent high warmth (n = 1,642, 71%)		2 Congruent moderate warmth (n = 398, 17%)		3 Congruent low warmth (n = 146, 6%)		4 Incongruent high mother/low father warmth (n = 69, 3%)		5 Incongruent low father/ lower mother warmth (n = 51, 2%)		Class differences p < .05
	M	SE	M	SE	M	SE	M	SE	M	SE	M	SE	
Mother's warmth[a]	13.94	0.04	14.67	0.01	12.88	0.06	10.96	0.14	14.22	0.13	7.84	0.21	1 > 2,3,4,5; 2 > 3,5; 3 > 5; 4 > 3,5
Father's warmth[a]	13.46	0.05	14.19	0.03	12.72	0.10	11.02	0.29	8.47	0.32	10.26	0.43	1 > 2,3,4,5; 2 > 3,4,5; 3 > 4,5; 5 > 4

Notes. Estimates were derived from weighted data and standard errors were adjusted for clustering.
[a]Range = 3–15.

(c) congruent low-level warmth (*Congruent Low Warmth, n* = 146, 6%); (d) incongruent warmth with mothers showing high level of warmth and fathers low warmth (*Incongruent High Mother/Low Father Warmth*, *n* = 69, 3%); and (e) incongruent warmth with fathers showing low warmth but mothers with lower warmth (*Incongruent Low Father/Lower Mother Warmth*, *n* = 51, 2%).

Table 3 shows the results of a multinomial logistic regression used to examine the associations between latent profile membership and a set of sociodemographic and substantive variables. The *Congruent High Warmth profile* was chosen as the reference profile to which other profiles were compared across associations with sociodemographic and substantive covariates. Youths' race, family income, and parents' education did not statistically predict membership in any of the profiles. For marital happiness, parents who reported higher marital happiness were more likely to be in the *Congruent High Warmth* profile than in the other profiles. For example, when comparing *Congruent Moderate Warmth* and *Congruent High Warmth profiles*, a one unit increase in marital happiness was associated with an 8% decrease in the odds of families (risk ratio of .92) exhibiting the congruent moderate warmth pattern versus the congruent high warmth pattern. Older youths were *less* likely to be in the "Congruent High Warmth" profile than in other profiles based on their relative risk ratios (not significant for *Congruent Low Warmth).* Females were less likely than males to be in the "Congruent High Warmth" profile than in the other profiles (not significant for "Congruent Low Warmth" and "Incongruent High Mother/Low Father Warmth"). In summary, adolescents in the "Congruent High Warmth" profile were more likely to be males, younger in age, and have parents who are happier in their marriage when compared with the other latent profiles.
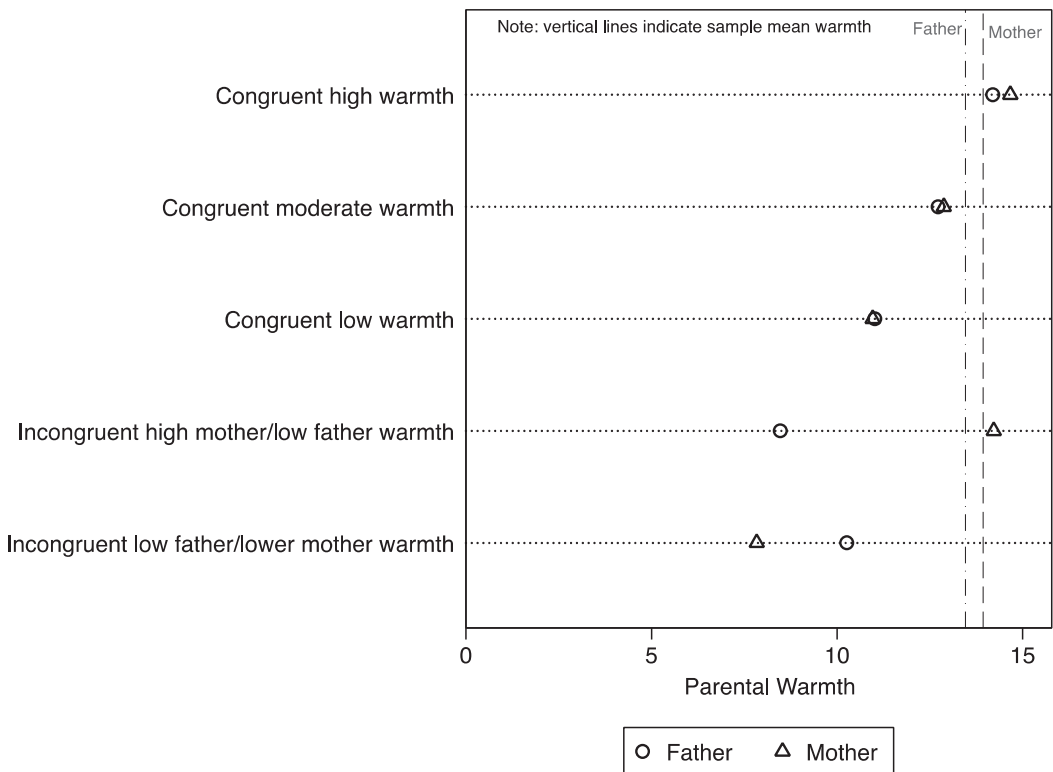

FIGURE 1. Latent Profile of Parental Warmth.

TABLE 3

Multinomial Logistic Regression for Variables Predicting Latent Profile Membership

Predictor	Congruent moderate warmth vs. high warmth[a]		Congruent low warmth vs. high warmth[a]		Incongruent high mother/low father vs. high warmth[a]		Incongruent low father/lower mother vs. high warmth[a]	
	RRR	95% CI	RRR	95% CI	RRR	95% CI	RRR	95% CI
Parent marital happiness	0.92*	0.85, 0.99	0.81***	0.73, 0.92	0.77***	0.68, 0.88	0.78*	0.62, 0.98
Youth age	1.27***	1.14, 1.43	1.08	0.94, 1.24	1.37***	1.14, 1.63	1.41**	1.10, 1.81
Youth gender (female)	1.44*	1.06, 1.95	1.55#	0.97, 2.49	1.26	0.67, 2.84	4.42***	1.86, 10.48
Youth race[b]								
Non-Hispanic non-Whites[c]	0.84	0.52, 1.37	0.88	0.44, 1.73	1.37	0.49, 3.82	0.93	0.34, 2.50
Hispanics	0.86	0.52, 1.42	0.61	0.28, 1.32	1.35	0.36, 4.436	2.14	0.65, 7.09
Family income	1.00	1.00, 1.00	1.00	1.00, 1.00	1.00	1.00, 1.00	1.00	1.00, 1.00
Parent education[d]								
Less than high school degree	0.87	0.45, 1.70	1.89	0.81, 4.42	2.25	0.42, 11.82	0.78	0.09, 6.91
Some college education	1.33	0.92, 1.91	0.77	0.42, 1.40	1.65	0.55, 4.99	1.47	0.31, 6.86
College education or more	1.04	0.73, 1.49	1.01	0.61, 1.67	1.36	0.49, 3.73	2.13	0.61, 7.49
Constant	0.01***	0.00, 0.10	0.15***	0.01, 1.67	0.00***	0.00, 0.06	0.00***	0.00, 0.01

Notes. RRR = relative risk ratios.

$F(36,96) = 3.92***$.

Continuous independent variables centered at grand mean.

[a]Referent category: congruent high warmth.

[b]Base category: Non-Hispanic Whites.

[c]This includes non-Hispanics African Americans, Asians, Native Americans.

[d]Base category: high school/GED; highest degree parents obtained.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

# $p < .10$.

With respect to our second study aim, Table 4 shows the results from multiple linear regression models used to examine the moderating role of latent profiles of parental warmth on the association between parental involvement and adolescents' academic outcomes. In terms of school engagement behaviors, results indicated that parents' home-based involvement at Wave I was a positive predictor of their children's school engagement behaviors at Wave II after controlling for other influences ($b = 0.10$, $p < .05$). All latent warmth profiles at Wave I significantly predicted lower levels of school engagement behaviors than *Congruent High Warmth* profile at Wave II. The two incongruent profiles (i.e., *Incongruent High Mother/Low Father Warmth* and *Incongruent Low Father/Lower Mother warmth*) had lower levels of Wave II school engagement behaviors than the congruent profiles (*Congruent Moderate* and *Congruent Low Warmth*). The profile that predicted the lowest level of school engagement behavior was *Incongruent High Mother/Low Father Warmth* ($b = -2.25$, $p < .001$). Results indicated that all the latent profiles of parental warmth did not have a significant moderating effect with parental involvement. In terms of model covariates, female adolescents reported significantly higher levels of school engagement behaviors than male adolescents at Wave II ($b = 0.72$, $p < .001$). Higher

TABLE 4

Multiple Linear Regression for Variables Predicting School Engagement and Grade Point Average (GPA)

Predictor	School engagement		GPA	
	B	**SE**	**B**	**SE**
Youth age	0.08	0.05	−0.01	0.02
Youth gender (female)	0.72***	0.14	0.24***	0.04
Youth race[a]				
Non-Hispanic non-Whites[b]	0.16	0.23	−0.22***	0.05
Hispanics	−0.25	0.32	−0.25**	0.09
Family income	0.00*	0.00	0.00*	0.00
Parent education[c]				
Less than high school degree	0.03	0.36	−0.02	0.08
Some college education	−0.37	0.23	0.10[#]	0.05
College education or more	−0.05	0.17	0.33***	0.05
Parent home-based involvement	0.10*	0.04	0.03**	0.01
Latent profiles of parental warmth[d]				
Congruent moderate warmth	−0.62***	0.18	−0.05	0.06
Congruent low warmth	−1.24***	0.35	−0.31***	0.08
Incongruent high mother/low father warmth	−2.25***	0.60	−0.19	0.14
Incongruent low father/lower mother warmth	−1.89*	0.78	−0.30[#]	0.16
Parent home-based involvement × latent profiles[d]				
Congruent moderate warmth	−0.03	0.09	0.00	0.03
Congruent low warmth	0.02	0.19	−0.10*	0.05
Incongruent high mother/low father warmth	−0.25	0.37	−0.09	0.10
Incongruent low father/lower mother warmth	−0.13	0.56	−0.03	0.10
Constant	12.17***	0.17	2.73***	
Unadjusted R^2		.07		.12
F		6.01***		11.56***

Notes. Continuous independent variables centered at grand mean.
[a]Base category: Non-Hispanic Whites.
[b]This includes non-Hispanics African Americans, Asians, Native Americans.
[c]Base category: high school/GED; highest degree parents obtained.
[d]Base category: congruent high warmth.
*$p < .05$.
**$p < .01$.
***$p < .001$.
[#]$p < .10$.

family income at Wave I predicted positive school engagement at Wave II ($b = 1.89\mathrm{e}^{-6}$, $p < .05$). This model explained about 7% of the variance in school engagement behaviors.

In terms of GPA, Table 4 shows that parents' home-based involvement at Wave I significantly predicted their children's GPA at Wave II ($b = 0.03$, $p < .01$). Only *Congruent Low Warmth* profile predicted GPA scores significantly lower than the *Congruent High Warmth* profile ($b = -0.31$, $p < .001$). A significant moderating effect was found for *Congruent Low Warmth* ($b = -0.10$, $p < .05$). Figure 2 shows that for *Congruent Low Warmth*, GPA slightly decreases as parental involvement increases, whereas for *Congruent High Warmth*, GPA increases as parental involvement increases. In terms of model covariates, similar to the results for school engagement outcome, female gender ($b = 0.24$, $p < .001$) and higher family income ($b = 7.98\mathrm{e}^{-7}$, $p < .05$) predicted higher GPA at Wave II. In addition, adolescents from both the minority race groups had significantly lower GPA than the majority White non-Hispanic group. Adolescents whose parents have a college education or more had better GPA than parents with only a high school/GED education ($b = 0.33$, $p < .001$). This model explained about 12% of the variance in school engagement behaviors.

DISCUSSION

The two primary aims of this study were (a) to identify profiles of parental warmth across mothers and fathers, and (b) to assess the extent to which profiles of parental warmth moderated the association between parental home-based involvement and adolescents' academic outcomes. The results show that there is notable variation in how fathers and mothers show their warmth and that these variations in parental warmth, together
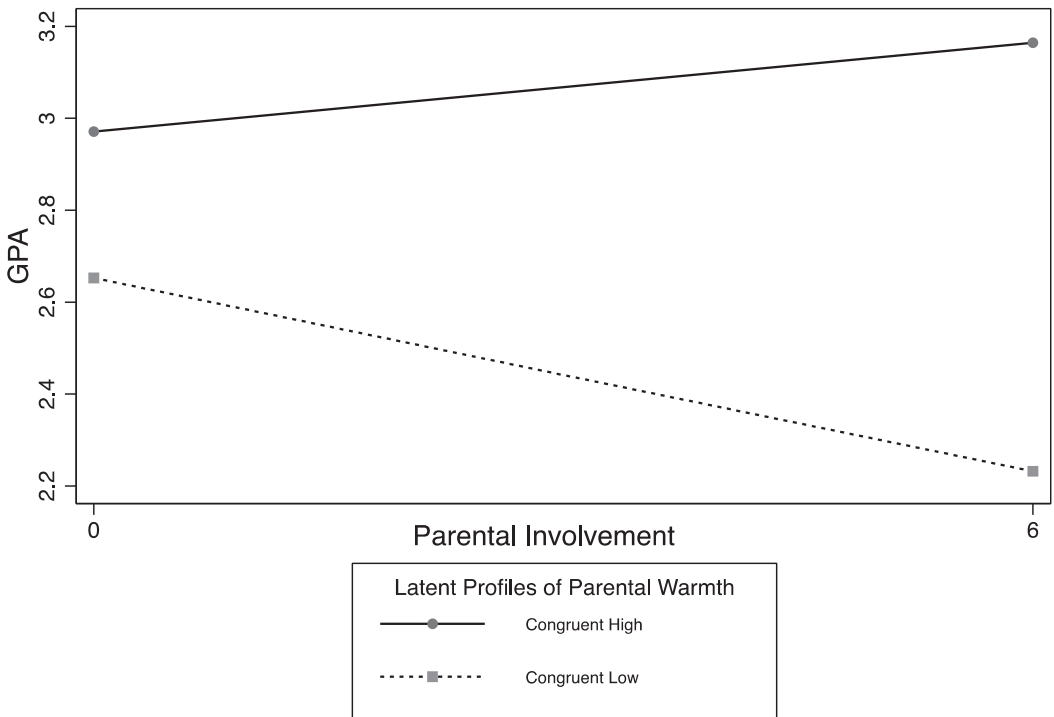

FIGURE 2. Relationship Between Parental Involvement and Grade Point Average.

with parents' involvement in their children's education, can influence adolescents' academic outcomes.

First, three of the profiles of parental warmth that emerged from the latent profile analysis, *Congruent High Warmth, Congruent Low Warmth*, and *Incongruent High Mother/Low Father Warmth*, are in line with existing studies that mostly focused on parents of young children (Martin et al., 2007; Meteyer & Perry-Jenkins, 2009). This indicates that there are some similarities in latent profiles of warmth between parents of young children and adolescents. In this study, we identified two new profiles—*Congruent Moderate Warmth* and *Incongruent Low Father/Lower Mother*—that were not identified in previous studies. Although the three congruent profiles (i.e., *Congruent High Warmth*, *Congruent Moderate Warmth*, and *Congruent Low Warmth*) vary in their level of warmth, they have one similarity: high levels of congruency in warmth shown by mothers and fathers. These three profiles were also the most prevalent in the sample. In addition, the fathers in the *Congruent High* and *Congruent Moderate Warmth* profiles have high levels of warmth that matches the mothers, indicating that the emotional expressive roles in families are not restricted to mothers, (Videon, 2005). The two profiles of incongruent parental warmth (i.e., *Incongruent High Mother/Low Father Warmth* and *Incongruent Low Father/Lower Mother*) were the least prevalent in this sample. Taken together, the results suggest wide variations in parental warmth across fathers and mothers in the population that are differentiated either by their level of warmth, level of congruency in warmth shown across parents, or both.

Parents in the *Congruent High Warmth* profile were more likely to have happier marriages than parents in the other profiles. Studies showed that the marital relationship of parents is a salient predictor of their coparenting abilities, defined as parents' abilities to cooperate effectively in parenting their child (Goldberg & Carlson, 2015). Happily married parents are more likely to have positive affections for each other that incline them to support each other in their parenting roles and to show more warmth to their children (Bonds & Gondoli, 2007). Furthermore, cooperative coparenting is also strongly associated with the quality and frequency of fathers' engagement with their children (Waller, 2012). The current study suggests that intervention efforts to improve parental warmth could begin with improving the marital relationship. This study did not find that family income and education predicted membership in any of the latent profiles of parental warmth after controlling for youth gender, age, and marital happiness, although previous studies showed evidence that socioeconomic characteristics predicted differences in parental warmth (Henninger & Gross, 2016). One explanation is that in this sample of mostly moderate to high SES families, youth gender, age, and marital happiness are more salient predictors of parental warmth than socioeconomic status.

The Integrative Model of Parenting suggests that the effects of parents' home-based involvement in their children's education depend on the relationship between parents and their children (Darling & Steinberg, 1993). Based on this model, the current study found that, relative to the reference group (Congruent High Warmth), *Congruent Low Warmth* profile moderated (weakened) the relationship between parental involvement and their adolescents' GPA. When both fathers and mothers do not have a close and warm relationship with their adolescent, it undermines the effectiveness of parents' involvement to improve their children's GPA. This result is in line with existing studies that found that parental warmth moderates the relationship between parental involvement and their adolescents' academic outcomes (Lowe & Dotterer, 2013; Spera, 2006). However, this study did not find a moderating role for any of the latent profiles of parental warmth on the relationship between parental involvement and school engagement behaviors. One possible explanation for this difference in finding is that school engagement also consists of cognitive (e.g., learning strategies) and emotional (e.g., enjoyment of school) components, in

addition to the behavioral component (Quin, Hemphill, & Heerde, 2017). Our measure of school engagement only captured information about the behavioral component. Parental warmth could have a significant moderating effect if all three components of school engagement were measured and analyzed.

The results of the current study support the positive direct effects of parents' home-based involvement on adolescents' GPA and school engagement in line with existing studies (Gordon & Cui, 2012; Hill & Tyson, 2009; Steinberg et al., 1992). Parents' monitoring and coaching of their adolescents' school work can help boost their academic abilities while ensuring they complete the work that is required by schools (Pomerantz et al., 2007). The positive effect of *Congruent High Warmth* on school outcomes compared to the other latent profiles of parental warmth found in this study is also in line with existing studies that support the positive relationships between parental warmth and academic outcomes (Spera, 2006; Steinberg et al., 1992). In addition, the findings of this study also showcase how the level of parental warmth and the level of congruency across fathers and mothers matters in influencing adolescent outcomes. This also supports why we cannot fully determine the effects of one's parenting on a child without considering the influence of the other parent (for cases in which there are two parents). When one parent is excluded or controlled for, we are likely to lose an accurate and precise understanding of the effects of parenting.

Limitations and Future Research

This study has some limitations that should be considered in the interpretation of the findings. First, the sample was limited to adolescents residing in opposite-sex, two-parent families so that variations in parental warmth could be analyzed in a homogenous family structure. However, this has the drawback of limiting the generalizability of results to other family types, such as same-sex families, cohabiting families, and stepfamilies. Second, the data used in this study came from a sample of individuals who were adolescents just before the turn of the century. Since dual-earner households are now more common, family structures more diverse, and contemporary fathers more involved in caring for their children than they were in previous decades (Cabrera et al., 2018), the patterns of fathers' and mothers' parenting may have shifted. Third, the use of person-oriented methods, including latent profile analysis, has been criticized for its "uncertainty about the ontological nature of emergent latent classes" (Jensen, 2018, p. 16). Hence, the latent profiles identified in this study should be considered as possible variations in fathers' and mothers' warmth in the larger population and not necessarily as true subpopulations (Petras & Masyn, 2010). Moving forward, researchers could assess parental warmth patterns in a more contemporary sample to determine if similar patterns emerge. Future studies could examine school engagement that includes behavioral, cognitive, and emotional components and investigate how the current study's outcomes may vary with youth gender or with cultural groups. The research can also expand to look at other contemporary issues of adolescence (e.g., Internet gaming problems, drug and alcohol usage) and in other diverse family structures such as same-sex families and stepfamilies.

Practical Implications

Despite the limitations, this study advances our understanding in the literature that can offer insights for family practice. First, family practitioners should be mindful of possible variations in parental warmth across parents, particularly paying attention to how levels of warmth interplay with congruency among parents. When an assessment is done for only one partner's parenting, practitioners should be aware that the assessment may not accurately represent the parenting that a child is experiencing in a two-parent family.

For parents who are not congruent in their warmth, practitioners could assess for possible marital problems that may be affecting their coparenting abilities.

Most adolescents in this study perceived their fathers as highly warm toward them and this had contributed positively to their academic outcomes. Although a wide body of studies supports the benefits of fathers' positive engagements with their children across different child outcomes (Cabrera et al., 2018), fathers are still excluded from the bulk of parental interventions (Panter-Brick et al., 2014). Since change within families seems unlikely to be sustained when only the mother is the sole target of a parenting intervention, family practitioners should, therefore, give more attention to engaging fathers in interventions.

REFERENCES

Asparouhov, T., & Muthén, B. (2014). Auxiliary variables in mixture modeling: Three-step approaches using Mplus. *Structural Equation Modeling: A Multidisciplinary Journal*, *21*(3), 329–341. https://doi.org/10.1080/10705511.2014.915181.

Berlin, K. S., Williams, N. A., & Parra, G. R. (2014). An introduction to latent variable mixture modeling (Part 1): Overview and cross-sectional latent class and latent profile analyses. *Journal of Pediatric Psychology*, *39*(2), 174–187. https://doi.org/10.1093/jpepsy/jst084.

Bonds, D. D., & Gondoli, D. M. (2007). Examining the process by which marital adjustment affects maternal warmth: The role of coparenting support as a mediator. *Journal of Family Psychology*, *21*(2), 288–296. https://doi.org/10.1037/0893-3200.21.2.288.

Bridgeland, J. M., DiIulio, J. J., & Morison, K. B. (2006). *The Silent Epidemic*: *Perspectives of High School Dropouts*. Washington, D.C., Retrieved from https://docs.gatesfoundation.org/documents/thesilentepidemic3-06final.pdf

Cabrera, N. J., Volling, B. L., & Barr, R. (2018). Fathers are parents, too! Widening the lens on parenting for children's development. *Child Development Perspectives*, *12*, 152–157. https://doi.org/10.1111/cdep.12275

Chen, P., & Chantala, K. (2014). *Guidelines for analyzing Add Health data*. Retrieved from http://www.cpc.unc.edu/projects/addhealth/data/guides/wt-guidelines.pdf

Collins, L. M., & Lanza, S. T. (2010). *Latent Class and Latent Transition Analysis: With Applications in the Social, Behavioral, and Health Sciences. Hoboken*. New Jersey: John Wiley & Sons.

Darling, N., & Steinberg, L. (1993). Parenting style as context: An integrative model. *Psychological Bulletin*, *113* (3), 487–496. https://doi.org/10.1037/0033-2909.113.3.487.

Fredricks, J. A., Blumenfeld, P. C., & Paris, A. H. (2004). School engagement: Potential of the concept, state of the evidence. *Review of Educational Research*, *74*(1), 59–109. https://doi.org/10.3102/00346543074001059.

Goldberg, J. S., & Carlson, M. J. (2015). Patterns and predictors of coparenting after unmarried parents part. *Journal of Family Psychology*, *29*(3), 416–426. https://doi.org/10.1037/fam0000078.

Gordon, L. C. (2000). Linking gender differences in parenting to a typology of family parenting styles and adolescent developmental outcomes. *Dissertation Abstracts International Section A: Humanities and Social Sciences*, *60*(11–A), 4196.

Gordon, M. S. (2016). Community disadvantage and adolescent's academic achievement: The mediating role of father influence. *Journal of Child and Family Studies*, *25*(7), 2069–2078. https://doi.org/10.1007/s10826-016-0380-2.

Gordon, M. S., & Cui, M. (2012). The effect of school-specific parenting processes on academic achievement in adolescence and young adulthood. *Family Relations*, *61*(5), 728–741. https://doi.org/10.1111/j.1741-3729.2012.00733.x.

Henninger, W. R., & Gross, P. E. (2016). Maternal warmth: A re-examination of the role race and socioeconomic status play. *Journal of Ethnic and Cultural Diversity in Social Work*, *25*(1), 36–49. https://doi.org/10.1080/15313204.2016.1145089.

Hill, N. E., & Tyson, D. F. (2009). Parental involvement in middle school: A meta-analytic assessment of the strategies that promote achievement. *Developmental Psychology*, *45*(3), 740–763. https://doi.org/10.1037/a0015362.

Hill, N. E., & Wang, M. T. (2015). From middle school to college: Developing aspirations, promoting engagement, and indirect pathways from parenting to post high school enrollment. *Developmental Psychology*, *51*(2), 224–235. https://doi.org/10.1037/a0038367.

Jensen, T. M. (2017). Constellations of dyadic relationship quality in stepfamilies: A factor mixture model. *Journal of Family Psychology*, *31*(8), 1051–1062. https://doi.org/10.1037/fam0000355.

Jensen, T. M. (2018). A typology of interactional patterns between youth and their stepfathers: Associations with family relationship quality and youth well-being. *Family Process*. Advance online publication. http://doi.org/http://dx.doi.org/10.1111/famp.12348.

Johnson, W., Brett, C. E., & Deary, I. J. (2010). The pivotal role of education in the association between ability and social class attainment: A look across three generations. *Intelligence*, *38*(1), 55–65. https://doi.org/10.1016/j.intell.2009.11.008

Kay, J. S., Shane, J., & Heckhausen, J. (2016). High-school predictors of university achievement: Youths' self-reported relationships with parents, beliefs about success, and university aspirations. *Journal of Adolescence*, *53*, 95–106. https://doi.org/10.1016/j.adolescence.2016.08.014.

Khaleque, A. (2013). Perceived parental warmth, and children's psychological adjustment, and personality dispositions: A meta-analysis. *Journal of Child and Family Studies*, *22*(2), 297–306. https://doi.org/10.1007/s10826-012-9579-z.

Laible, D. J., & Carlo, G. (2004). The differential relations of maternal and paternal support and control to adolescent social competence, self-worth, and sympathy. *Journal of Adolescent Research*, *19*(6), 759–782. https://doi.org/10.1177/0743558403260094.

Langenkamp, A. G. (2016). Effects of school mobility on adolescent social ties and academic adjustment. *Youth and Society*, *48*(6), 810–833. https://doi.org/10.1177/0044118X13517908.

Lo, Y., Mendell, N. R., & Rubin, D. B. (2001). Testing the number of components in a normal mixture. *Biometrika*, *88*(3), 767–778. https://doi.org/10.1093/biomet/88.3.767

Lowe, K., & Dotterer, A. M. (2013). Parental monitoring, parental warmth, and minority youths' academic outcomes: Exploring the integrative model of parenting. *Journal of Youth and Adolescence*, *42*(9), 1413–1425. https://doi.org/10.1007/s10964-013-9934-4.

Martin, A., Ryan, R. M., & Brooks-Gunn, J. (2007). The joint influence of mother and father parenting on child cognitive outcomes at age 5. *Early Childhood Research Quarterly*, *22*(4), 423–439. https://doi.org/10.1016/j.ecresq.2007.07.001.

Martin, A., Ryan, R. M., & Brooks-Gunn, J. (2010). When fathers' supportiveness matters most: Maternal and paternal parenting and children's school readiness. *Journal of Family Psychology*, *24*(2), 145–155. https://doi.org/10.1037/a0018073.

Meteyer, K. B., & Perry-Jenkins, M. (2009). Dyadic parenting and children's externalizing symptoms. *Family Relations*, *58*, 289–302. https://doi.org/10.1111/j.1741-3729.2009.00553.x

Murray, C. (2009). Parent and teacher relationships as predictors of school engagement and functioning among low-income urban youth. *The Journal of Early Adolescence*, *29*, 376–404. https://doi.org/10.1177/0272431608322940

Muthén, L., & Muthén, B. (2012). Mplus user's guide (version 7.0). *Mplus User's Guide (Seventh Edition)*, 1–850. http://doi.org/10.1111/j.1600-0447.2011.01711.x

Nagin, D. S., & Odgers, C. L. (2010). Group-based trajectory modeling in clinical research. *Annual Review of Clinical Psychology*, *6*, 109–138. https://doi.org/10.1146/annurev.clinpsy.121208.131413.

Nylund-Gibson, K., & Masyn, K. E. (2016). Covariates and mixture modeling: Results of a simulation study exploring the impact of misspecified effects on class enumeration. *Structural Equation Modeling: A Multidisciplinary Journal*, *23*(6), 782–797. https://doi.org/10.1080/10705511.2016.1221313.

Panter-Brick, C., Burgess, A., Eggerman, M., McAllister, F., Pruett, K., & Leckman, J. F. (2014). Practitioner review: Engaging fathers – Recommendations for a game change in parenting interventions based on a systematic review of the global evidence. *Journal of Child Psychology and Psychiatry and Allied Disciplines*, *55*, 1187–1212. https://doi.org/10.1111/jcpp.12280

Petras, H., & Masyn, K. (2010). General growth mixture analysis with antecedents and consequences of change. In A. Piquero & D. Weisburd (Eds.), *Handbook of quantitative criminology* (pp. 69–100). New York: Springer. https://doi.org/10.1007/978-0-387-77650-7

Pomerantz, E. M., Moorman, E. A., & Litwack, S. D. (2007). The how, whom, and why of parents' involvement in children's academic lives: More is not always better. *Review of Educational Research*, *77*(3), 373–410. https://doi.org/10.3102/003465430305567.

Quin, D., Hemphill, S. A., & Heerde, J. A. (2017). Associations between teaching quality and secondary students' behavioral, emotional, and cognitive engagement in school. *Social Psychology of Education*, *20*(4), 807–829. https://doi.org/10.1007/s11218-017-9401-2.

Rohner, R. P., Khaleque, A., & Cournoyer, D. E. (2005). Parental acceptance-rejection: Theory, methods, cross-cultural evidence, and implications. *Ethos*, *33*(3), 299–334. https://doi.org/10.1525/eth.2005.33.3.299

Schwarz, G. (1978). Estimating the dimension of a model. *The Annals of Statistics*, *6*(2), 461–464. https://doi.org/10.1214/aos/1176344136.

Spera, C. (2005). A review of the relationship among parenting practices, parenting styles, and adolescent school achievement. *Educational Psychology Review*, *17*(2), 125–146. https://doi.org/10.1007/s10648-005-3950-1.

Spera, C. (2006). Adolescents' perceptions of parental goals, practices, and styles in relation to their motivation and achievement. *Journal of Early Adolescence*, *26*(4), 456–490. https://doi.org/10.1177/0272431606291940.

Steinberg, L., Lamborn, S. D., Dornbusch, S. M., & Darling, N. (1992). Impact of parenting practices on adolescent achievement: Authoritative parenting, school involvement, and encouragement to succeed. *Child Development*, *63*(5), 1266–1281. https://doi.org/10.2307/1131532.

Videon, T. M. (2005). Parent-child relations and children's psychological well-being: Do dads matter? *Journal of Family Issues*, *26*(1), 55–78. https://doi.org/10.1177/0192513X04270262.

Waller, M. R. (2012). Cooperation, conflict, or disengagement? Coparenting styles and father involvement in fragile families. *Family Process*, *51*(3), 325–342. https://doi.org/10.1111/j.1545-5300.2012.01403.x

Wang, M. T., & Sheikh-Khalil, S. (2014). Does parental involvement matter for student achievement and mental health in high school? *Child Development*, *85*(2), 610–625. https://doi.org/10.1111/cdev.12153.

Wilder, S. (2016). Effects of parental involvement on academic achievement: A meta-synthesis. *Education Review*, *66*(3), 377. https://doi.org/10.1080/00131911.2013.780009.