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Family Context, Mexican-Origin Adolescent Mothers' Parenting Knowledge, and Children's Subsequent Developmental Outcomes

Laudan B. Jahromi, Amy B. Guimond, Adriana J. Umaña-Taylor, Kimberly A. Updegraff, and Russell B. Toomey

Arizona State University

Abstract

This study examined parenting knowledge among Mexican-origin adolescent mothers ($N = 191$; M age = 16.26 years), family contextual factors associated with adolescents' parenting knowledge, and toddlers' (M age = 2.01 years) subsequent developmental outcomes. Data came from home interviews and direct child assessments. Adolescents both under- and over-estimated children's developmental timing, and showed differences in their knowledge of specific developmental domains. Instrumental support from mother figures was positively linked to adolescents' knowledge accuracy, whereas emotional support was negatively related to adolescents' knowledge confidence. Furthermore, whereas mother figures' autonomy-granting was positively linked to knowledge confidence, psychological control was associated with less accurate adolescent parenting knowledge. Toddlers of adolescents with more accurate knowledge showed positive developmental functioning. Intervention implications are discussed.

Parents' cognitions, particularly their knowledge about children's development, are an important dimension of parenting competence. Parenting knowledge helps form parents' beliefs and practices with their children and, in turn, children whose parents have more accurate knowledge about such things as developmental milestones and effective childrearing practices show better cognitive and behavioral outcomes (Benasich & Brooks-Gunn, 1996; Dichtelmiller et al., 1992; Whitman, Borkowski, Keogh, & Weed, 2001). It is critical, therefore, to better understand factors that inform this dimension of parenting competence, particularly in vulnerable parent-child dyads, such as *adolescent* mothers and their children (Whitman et al., 2001). The present study examined parenting knowledge among Mexican-origin adolescent mothers, a significant population to study because they have the highest birthrate of all ethnic groups in the U.S. (National Vital Statistics Report, 2007) and face substantial contextual risk factors (e.g., poverty, single motherhood, depression) as young mothers (Ryan, Franzetta, & Manlove, 2005). Specifically, we examined how aspects of the family context (e.g., social support) were associated with

Correspondence should be addressed to Laudan B. Jahromi, School of Social and Family Dynamics, Arizona State University, Tempe, AZ, 85287-3701; Laudan.Jahromi@asu.edu.

Author Note. All co-authors are affiliated with the School of Social and Family Dynamics, Arizona State University, Tempe, AZ 85287-3701.

adolescent mothers' parenting knowledge and, in turn, their children's developmental functioning (see Figure 1 for the conceptual model).

Parenting Knowledge in Adolescent Mothers

Theoretical models of adolescent parenthood differ from general parenting models (Belsky, 1984) in their emphasis on the role of parents' cognitive readiness (i.e., knowledge and attitudes about children and childrearing) in explaining individual differences in their parenting behaviors and their children's outcomes (Contreras et al., 2002; Sommer, 1993; Whitman, Borkowski, Schellenbach, & Nath, 1987). Indeed, adolescent mothers' cognitive readiness to parent has been shown to be the strongest prenatal predictor of their parenting outcomes in infancy (Whitman et al., 2001). Parenting knowledge, conceptualized here as one facet of cognitive readiness, includes knowledge about childhood norms and milestones, principles about developmental processes, parenting strategies, and health and safety issues (MacPhee, 2002). In line with the basic premise of cognitive-behavioral theory, knowledge is thought to influence parents' beliefs and interpretations about their children's behaviors, which in turn affects how they interact with their children and the type of learning context they provide (Bornstein, Cote, Haynes, Hahn, & Park, 2010; McGillicuddy-DeLisi & Sigel, 1995; Miller, 1988). Empirical evidence reveals that, even after controlling for socioeconomic status, parenting knowledge is significantly associated with more responsivity (Stevens, 1984), appropriate levels of play behaviors and timing of new experiences (Bornstein, et al., 2010; Damast, Tamis-LeMonda, & Bornstein, 1996), support of children's cognitive and language development (Stevens, 1984), and better developmental stimulation in the home environment (Benasich & Brooks-Gunn, 1996).

The construct of parenting knowledge can be further delineated into how *accurate* one's knowledge is (i.e., correct assumptions about child development), and how *confident* or certain a parent feels about his or her knowledge (MacPhee, 2002; McGillicuddy-DeLisi & Sigel, 1995). Based on extensive review of theoretical and empirical work on parent cognitions, beliefs, and knowledge, MacPhee (2002) argues for the importance of studying both dimensions of knowledge because parents may vary along both dimensions in meaningful ways; most of the research to date, however, has focused only on accuracy. Knowledge confidence can be conceptualized as reflecting one's awareness or appreciation of how much information one knows about a particular topic. Important to the present study, there appear to be important differences in the correlates of parents' accurate knowledge versus their confidence in their knowledge. Informal experiences with children (e.g., babysitting), for example, positively relate to confidence in parental knowledge, but inversely relate to accuracy (MacPhee, 2002). Thus, there is a need to better understand predictors of both dimensions of parenting knowledge, and to examine the consequences of both dimensions on children's development.

Although much of the previous work on adolescent mothers' parenting knowledge has focused on identifying differences with adult mothers (see Bornstein et al., 2010), more recently researchers have turned their attention to better describing knowledge among adolescent mothers by examining the nature of their accuracies and inaccuracies in different domains. Tamis-LeMonda, Shannon, and Spellmann (2002), for example, found that low-

income adolescent mothers had more accurate knowledge about cognitive, language, and motor abilities than play and social development. Moreover, adolescents were more accurate about the order than the timing of developmental milestones, and about development in their child's current developmental stage than about subsequent development. These findings may help inform the content of parenting interventions for adolescent mothers. Indeed, the types of errors parents make with respect to developmental timing offer important insight as to how knowledge affects children's outcomes. Parents' under-estimations of children's ability (i.e., expecting too little, too late) could lead to less developmentally-appropriate stimulation than needed, whereas over-estimations of children's abilities (i.e., expecting too much, too soon) may lead to frustration on the part of the child and parent, increasing parents' punitive behavior (MacPhee, 2002).

It also is important to bear in mind the cultural context of Mexican-origin adolescent mothers, as culture can have important implications for parenting beliefs and practices (Harkness & Super, 2001). For instance, cultural norms could inform childrearing practices and these practices may inform children's development (Buriel, 1993). Indeed, Tamis-LeMonda et al. (2002) found that Mexican American mothers used more gestures than spoken language during infancy, and their children had better gestural fine motor skills as toddlers. Although these links have not been made to parenting knowledge, it is conceivable that cultural norms could inform practices that hinder or augment the parenting knowledge of adolescent mothers. To our knowledge, there are no data on the nature of inaccuracies in Latina *adolescent* mothers in particular, but studies have reported less accurate knowledge about normative milestones and parent-infant relationships in South American, as compared to European American, adult mothers (Bornstein & Cote, 2004a), and more under-estimation errors (i.e., expecting too little, too late) among foreign-born than U.S.-born Hispanic adult mothers (Zepeda & Espinosa, 1988). Immigration status may partially explain these differences, as immigrant mothers from different cultures (e.g., Japanese and South American) show similar amounts and patterns of parenting knowledge, but differ from their U.S.-born counterparts (Bornstein & Cote, 2004b). Some have argued that foreign-born parents may be exposed to less information about developmental timing than parents in the U.S., where there is a greater reliance on formal and written sources of parenting information (Bornstein & Cote, 2004b), or that foreign-born parents may experience less pressure to promote the early development of their children (Zepeda & Espinosa, 1988).

Given this background, our first goal was to provide an in-depth description of parenting knowledge among this population with a focus on both their *accuracy* and their *confidence* in their knowledge. We also aimed to describe adolescents' inaccuracies (under-estimations and over-estimations of developmental timing), and examine whether there were differences in adolescents' knowledge about specific developmental domains. Based on previous research on adolescent knowledge (Tamis-LeMonda et al., 2002), we expected adolescents to both under- and over-estimate the developmental timing of children's milestones, and to be less knowledgeable about social development than about cognitive, language, and motor milestones. Furthermore, because prior work suggests that nativity and years living in the U.S. may explain some variation in parents' knowledge of child norms and childrearing

strategies (Bornstein & Cote, 2004a; Buriel, 1993), we examined variability in parenting knowledge by adolescent mother nativity and years living in the U.S.

Understanding Predictors of Adolescent Mothers' Knowledge

Little is known about the role of family relationships in predicting adolescents' parenting knowledge. Drawing on an ecological framework (Bronfenbrenner, 1989), which emphasizes that individual development is shaped in the context of individuals' interactions with their environments, we consider the role of the adolescent's relationship with her mother figure in predicting her parenting knowledge. Theoretical accounts of parenting consider social support to play a central role in predicting parents' competence (Belsky, 1984) and models of adolescent parenthood emphasize the support provided from family members (Whitman et al., 1987). Specific to Mexican-origin families, a salient cultural value among Latino cultures in the U.S. is familism, which is characterized by strong feelings of obligation and support toward family members (Villarreal, Blozis, & Widaman, 2005). Indeed, given the salience of familism values in Latino families, support from family has been identified as an important predictor of Latina adolescent mothers' parenting (Contreras et al. 2002; Grau, Azmitia, & Quattlebaum, 2009).

Theoretically, the more support the adolescent mother is provided, the more exposure and subsequent knowledge she will gain about pertinent information concerning her child (Nath et al., 1991). The limited empirical findings linking social support and knowledge for adolescent mothers are mixed, however. O'Callaghan et al. (1999) found no relation between prenatal social support and adolescent mothers' prenatal parenting knowledge, and Bogat et al. (1998) found global social support to be unrelated to adolescent mothers' over-estimation errors, whereas East and Felice (1996) found a positive link between high grandmother instrumental support and adolescent mothers' knowledge. It may be that support measured *prenatally* is not as relevant as that measured once adolescents assume parenting responsibilities, and that global support does not adequately capture the construct of social support, which has been shown to differentiate across the transition to parenthood (Whitman et al., 2001; Toomey, Umaña-Taylor, Jahromi, & Updegraff, 2013).

In the present study, we extend this line of work by examining multiple dimensions of social support provided by mother figures, including instrumental support or information about parenting, emotional support, and companionship support, or participation in enjoyable interactions. Because direct sources of information are associated with more accurate parenting knowledge (MacPhee, 2002) and an opportunity for mothers to seek information to confirm their maternal identities or self-definitions (Deutsch, Ruble, Fleming, Brooks-Gunn, & Stangor, 1988), we hypothesized that mother figures' instrumental support would increase adolescent mothers' accurate knowledge (Nath et al., 1991). Instrumental support, which includes the provision of information from mother figures (e.g., getting ideas about parenting) or help with childcare activities (e.g., rides to the child's doctor), may be conceptualized as a context in which the adolescent might be exposed to parenting information, either through direct communication or by witnessing caretaking behaviors in shared activities with the child. Furthermore, given the importance of emotional support and companionship for psychosocial adjustment and self-efficacy (Dunkel-Schetter, Sagrestano,

Feldman, & Killingsworth, 1996; East & Felice, 1996; Rook & Underwood, 2000; Sherbourne & Stewart, 1991), we expected these dimensions of support to increase adolescents' knowledge confidence (See Figure 1).

Other aspects of the family context, particularly parenting practices of the mother figure, could also relate to adolescent mothers' cognitive readiness to parent. Adolescent mothers must simultaneously negotiate several normative developmental processes characteristic of adolescence, including individuation and identity formation, while managing the transition to parenthood (Whitman et al., 2001). An important developmental goal of adolescence is the desire to seek more autonomy and independence from one's parents (Collins, Laursen, Mortensen, Luebker, & Ferreira, 1997), which is thought to promote general healthy development (Schaefer, 1965). Indeed, adolescents with parents who practice an authoritative parenting style (i.e., emotionally supportive, autonomy granting, and firm) show lower anxiety and depression, and higher self-esteem (Gray & Steinberg, 1999; Steinberg, Lamborn, Darling, & Mounts, 1994).

Given the importance of autonomy development to adolescents' identity formation (Erikson, 1968), and to self-esteem and ego development (Allen, Hauser, Bell et al., 1994; Gray & Steinberg, 1999; Steinberg et al., 1994), greater autonomy granting by mother figures may be viewed as a positive socialization practice for adolescent mothers' confidence in their role as mothers and, thus, lead to greater confidence in their parenting knowledge. Indeed, findings with Mexican-origin families indicated that fewer discrepancies in autonomy expectations between mothers and adolescent daughters were associated with better family functioning and adolescent mental health (Bámaca-Colbert, Umaña-Taylor, & Gayles, 2012). Because Mexican-origin adolescent mothers may place a particularly strong emphasis on how family members perceive them, their mothers' belief in them as demonstrated by levels of autonomy granting, may play a critical role in adolescent mothers' confidence as a parent. Thus, we hypothesized that autonomy granting may promote adolescents' ongoing maternal identity development, and thus, positively predict adolescents' confidence in their knowledge as a parent.

Contrary to autonomy-granting, the construct of psychological control is associated with more authoritarian styles of parenting and consists of coercive, passive-aggressive hostility toward adolescents (Barber, 1996), which has been positively linked to externalizing and internalizing problems (Gray & Steinberg, 1999). Controlling parenting styles may be associated with adolescents' reduced sense of self-determination and self-regulated motivation (e.g., Grolnick, Deci, & Ryan, 1997), which may undermine their motivation and drive to engage in certain actions (Ryan & Deci, 2000). For adolescent mothers who are negotiating multiple roles, taking on the difficult responsibilities of parenting can be viewed as a burden that is inconsistent with normative goals of adolescence. The parenting context provided by adolescents' mother figures may either support or undermine adolescents' motivation to take on an active role as their child's caregiver, which may influence the degree to which she gains accurate parenting knowledge. Although there is no empirical work on this construct concerning adolescent mothers' caregiving behaviors or parenting knowledge in particular, the work on parents' influence on adolescents' behaviors in other contexts suggests that adolescents are less intrinsically motivated to participate in activities

for which they perceive too much external psychological control from parents, even if they are inherently interested in those activities (Ryan & Deci, 2000). Thus, in line with self-determination theory (Ryan & Deci, 2000), we hypothesized that mother figures who exert more psychological control may *undermine* adolescents' intrinsic motivation to take an active role in parenting, which may lead to adolescent mothers' decreased experiences with their children and fewer opportunities to gain accurate knowledge about child development. Furthermore, given the emphasis placed on family relationships in Mexican culture (Cauce & Domenech-Rodriguez, 2002), the quality of the mother-daughter relationship may have a particularly significant impact on Mexican-origin adolescent mothers' parenting experiences.

Examining How Parenting Knowledge Accuracy and Confidence Inform Developmental Functioning

What are the consequences of adolescents' parenting knowledge for their children's later developmental outcomes? Theoretically, because adolescent mothers with more accurate parenting knowledge are thought to have more competent parenting behaviors, their children are expected to show better developmental outcomes (Miller, 1988; Sommer et al., 1993). Empirically, there is longitudinal evidence of a link between parenting knowledge and children's outcomes. For example, Whitman et al. (2001) found that a composite prenatal measure of adolescent mothers' cognitive readiness positively predicted their children's IQ (Stanford Binet) and receptive language (Peabody Picture Vocabulary Test; PPVT) at age 3 and 5 years. Among mothers of high risk infants (i.e., low birth weight), mothers' accurate parenting knowledge after birth was positively related to scores on the Bayley Mental Development Index at 8 months (Dichtelmiller et al, 1992), and maternal knowledge accuracy at 12 months was shown to predict 36-month IQ (Stanford Binet; Benasich & Brooks-Gunn, 1996). It should be noted that the abovementioned studies revealed longitudinal, but not prospective, relations as they did not control for the child's cognitive functioning at an earlier timepoint. The limited findings to date directly linking accurate parenting knowledge to children's cognitive outcomes are compelling, and point to the importance of examining parenting knowledge as a predictor of developmental functioning in toddlers of adolescent mothers. We aimed to build on prior research by examining whether both adolescent mothers' knowledge accuracy *and* confidence prospectively predicted their children's developmental functioning at age two (e.g., Whiteman et al., 2001), accounting for children's development at 10 months. Our study will offer an understanding of the relative importance of adolescents' parenting knowledge, given the cultural context of Latino families who are likely to share responsibility for childrearing, while controlling for important contextual factors. We expected that children whose mothers displayed relatively more accurate knowledge during infancy would show positive developmental functioning by toddlerhood, and we explored the link between knowledge confidence and children's development as, to our knowledge, there has been no previous work on knowledge confidence as a predictor of children's developmental functioning.

Method

Participants

Data came from three waves (W1, W2, and W3) of a longitudinal study of Mexican-origin adolescent mothers and their mother figures ($N = 191$ dyads) recruited from a large metropolitan area in the southwestern U.S. (Umaña-Taylor, et al., 2011). Of 305 adolescent mothers who were recruited for participation, 45 were ineligible because they were not pregnant ($n = 23$); they were not between 15-18 years of age ($n = 12$); they did not have a mother figure willing to participate ($n = 4$); they were not of Mexican origin ($n = 3$); and they were married ($n = 3$). Of those eligible to participate ($n = 260$), 39 declined and 14 were not reachable for scheduling or interviews after multiple attempts. Of the resulting sample ($N = 207$), first-time adolescent mothers ($N = 191$) were included in the present analyses.

At W1, adolescents were in their third trimester of pregnancy and became first time mothers by W2, when the infants were approximately 10 months old ($M = 10.15$ months, $SD = .26$). At W3, infants were 24 months old ($M = 24.13$, $SD = .23$). At W1, adolescents were 16.26 years old ($SD = .96$) and mother figures were 40.78 ($SD = 6.78$) years old, on average. The majority of adolescents co-resided (88.0%) with mother figures at W1. Mother figures included adolescents' biological mothers (89.0%), grandmothers (2.6%), aunts (2.1%), boyfriends' mothers (3.1%), and other kin (3.1%).

At W1, 60.7% of adolescents were enrolled in school, 34.6% had dropped out of school, and 4.7% had graduated from high school or earned a GED. At W2, 39.8% were enrolled in school, 40.3% had dropped out of school, 16.8% had graduated from high school or earned a GED, and 3.1% had missing data. Mother figures reported an average education level of 9th grade ($SD = 3.34$). With respect to nativity, 63.4% of adolescents and 31.4% of mother figures were born in the United States. Among adolescents and mother figures born in Mexico, they lived in the U.S for 12.76 ($SD = 5.14$) and 23.26 years ($SD = 14.73$), respectively. Adolescents who lived with their mother figures had a mean annual household income of \$27,614 ($SD = \$20,404$; range = \$94 – \$114,000) as reported by mother figures, and those who supported themselves ($n = 7$), reported a mean hourly wage of \$7.29 ($SD = 1.47$; range = \$5.25 - \$10).

At W1, when adolescents were in their third trimester of pregnancy, a majority indicated they were in a relationship with the biological father of the child (68.6%) or with another individual (3.7%). Most adolescents reported living with at least one other family member at W1 (range = 0 – 7; $M = 1.83$, $SD = 1.48$); for instance, 88% reported coresiding with their mother figure, and 77.5% reported living with at least one older sibling. The amount of emotional, instrumental, and companionship support provided by the mother figure did not differ based on whether adolescents coresided with their mother figure, or whether adolescents were in a relationship with the child's biological father.

Procedure

Adolescent participants were recruited during their third trimester of pregnancy from high schools, health centers, and community resource centers. Criteria for participation included: (a) being an adolescent of Mexican-origin between the ages of 15 and 19 years, (b) being

unmarried, and (c) having a mother figure that was willing to participate with them in the study. Participants over 17 years of age provided informed consent, and parental consent and youth assent was obtained for those under 18. The retention rate, where at least one member of the triad participated, was 96% at W2 and 88% at W3. Data were collected via face-to-face interviews lasting about 2.5 hours. Interviewers received extensive training that included cultural sensitivity. Interviewers were predominantly bilingual (63%); a majority self-identified as Hispanic/Latino (77.8%), while the next largest self-identified group was European American (18%).

The majority of interviews at all three phases were conducted in participants' homes (100% at Wave 1; > 96% at Waves 2 and 3). Interviews were conducted by phone at Waves 2 and 3 when it was not possible to conduct the interview in person. All child visits were conducted in person. Semi-structured interviews were conducted in participants' preferred language, with an average 64.8% of adolescent interviews and 29.8% of mother figure interviews conducted in English across W1 to W3.

Measures

Background Characteristics (W1; W2)—All measures were translated into Spanish and back translated into English by two separate individuals using the translation procedures outlined in Knight, Roosa, and Umaña-Taylor (2009). Demographic information was obtained during the interview at W1 including *adolescent age*, *adolescent nativity* (i.e., country of origin), *educational attainment* of the adolescent and mother figure (i.e., years of school completed), and adolescents' *exposure to other children* in the household (i.e., the number of children under the age of five who lived in the household with the adolescent). Adolescents' participation in *parenting education classes* (W2) was assessed using a sum of five items that asked adolescents whether they had attended classes on childbirth, childcare, or parenting, and whether they had participated in a mentoring program about being an adolescent mother over the past year. Higher scores reflected more parenting education.

The extent to which the adolescent served as the primary caregiver of the infant at W2 was assessed using the 6-item *Primary Caregiver* scale on which adolescents reported who spends more time engaging in particular activities with the baby (e.g., playing and calming). Responses ranged from 1 (*[My mom/mother figure name] does this much more than I do*) to 5 (*I do this much more than [My mom/mother figure name] does*). Mean scores were calculated across all items, and higher scores indicated greater responsibility on the part of the adolescent as the child's primary caregiver.

Social Support from Mother (W2)—Adolescents' perceptions of social support received from their mother figures when infants were 10 months old were measured using an adapted version of the Global Support from Mother Figure Postpartum Scale (GSMF-PP) (Umaña-Taylor, Updegraff, White, Herzog, Pflieger, & Madden-Derdich, 2011). Respondents were asked to think about the last six months and respond to items related to social support received from the mother figure regarding parenting. The GSMF-PP uses a five-point Likert scale with responses ranging from 1 (*not at all*) to 5 (*very much*). Three subscales of the GSMF-PP during parenthood [i.e., emotional support (7 items, e.g., "I feel that I can share

my worries and fears with [my mom/mother figure name]), instrumental and informational support (4 items, e.g., “[My mom/mother figure name] provides helpful information about parenting”; “I could get help related to my parenting from [my mom/mother figure name], such as a ride to the doctor or clothes for the baby”), and companionship support (4 items, e.g., “[My mom/mother figure name] and I get together to have fun and relax”)] were derived in previous work with this longitudinal sample, and findings provided support for their reliability and validity of this measure (Umaña-Taylor, et al., 2011; Toomey, et al., 2013). Mean scores were calculated by averaging across the items within each subscale, with higher scores indicating higher levels of support for adolescents from mother figures. This measure has been used with Mexican-origin individuals, including adolescents, and has been shown to demonstrate validity across English and Spanish-speaking participants (Toomey, et al., 2013). In the current study, Cronbach's alphas at W2 for interviews conducted in English and Spanish, respectively, were .84 and .80 for instrumental, .95 and .95 for emotional, and .83 and .84 for companionship support.

Knowledge of Infant Development (W2)—Knowledge of infant development at W2 was assessed using a 19-item version of the Knowledge of Infant Development Inventory (KIDI; MacPhee, 2002) adapted by Benasich and Brooks-Gunn (1996). The psychometric properties of the KIDI indicate the measure is free of sociocultural bias, valid from a cross-cultural perspective, and accessible to individuals with no more than a 6th grade education (Bornstein et al., 2007). Adolescents and mother figures were asked to indicate their knowledge about child norms and milestones, child development principles, parenting strategies, and health and safety. Items (e.g., “Most babies can sit on the floor without falling over at 7 months”) were rated on a 4-point scale, with choices of 1=Agree, 2=Younger, 3=Older, and 4=Not sure. Items are recoded as right (+1), wrong (-1), or not sure (0), and the number of items answered *unsure*, the number *answered correct*, the number *answered wrong*, the number that were *under-estimated*, and the number that were *over-estimated* were computed. *Knowledge accuracy* was computed by dividing the number of correct items by the number of items answered, and *knowledge confidence* reflected the number of items to which the adolescent did not answer “unsure” (i.e., gave an answer of 1, 2, or 3) divided by the total number of items in the scale. For the purposes of describing adolescents' knowledge of specific developmental domains, items were also categorized as reflecting the domains of cognition (22% of items; e.g., “Twelve month old babies can remember toys they have watched being hidden”), language (22% of item; e.g., “Babies usually say their first complete word at 6 months”), social (28% of items; e.g., “Three month old babies usually will smile when they see an adult's face”), and motor development (28% of items; e.g., “Most babies can sit on the floor without falling over at 7 months”).

Psychological Control (W2)—Adolescents' reports of psychological control by the mother figure (W2) were measured using a modified version of the 8-item Psychological Control Scale-Youth Self-Report (PCS-YSR; Barber, 1996), which was adapted from the Children's Report of Parent Behavior Inventory (CRPBI; Schaefer, 1965). Items (e.g., “My mother changes the subject whenever I have something to say”) were scored on a 5-point Likert scale. This scale has been developed and tested using cross-cultural samples (Barber et al., 2005). Responses ranged from 1 (*almost never*) to 5 (*almost always*), and higher

scores indicate greater psychological control from mother figures. Cronbach's alphas were .71 (English) and .78 (Spanish).

Behavioral Autonomy (W2)—Behavioral autonomy from mother figures (W2), or the degree to which mother figures allowed adolescents to make their own decisions and engage in activities without excessive parental intrusion, was measured using Peterson, Bush, and Supple's (1999) 10-item Behavioral Autonomy Scale. Adolescents indicated the extent to which they agreed or disagreed with each statement (e.g., *[My mom/mother figure name] allows me to decide what clothes I should wear without interfering too much*) using a 4-point Likert scale ranging from 1 (*Strongly Disagree*) to 4 (*Strongly Agree*). This measure has demonstrated adequate cross-cultural validity with Mexican adolescents (Supple, Ghazarian, Peterson, & Bush, 2009). Cronbach's alphas were .84 (English) and .88 (Spanish) in the current sample.

Child Developmental Functioning (W2; W3)—Children's developmental functioning was measured with the Bayley Scales of Infant Development-Second Edition (BSID-II; Bayley, 1993) when children were approximately 10 months (W2) and 24 months (W3) old. The BSID-II measures developmental functioning for children ages 1 to 42 months. The Mental Development Index (MDI) score derived from the BSID was used as a measure of child developmental functioning in the current study. The MDI has demonstrated good scale reliability (alphas = .78 and .92 at 10 and 24 months, respectively) and test-retest reliability, $r = .83$ (Bayley, 1993).

Results

Analytic Plan

A structural equation modeling framework with path analysis in Mplus 6.1 (Muthén & Muthén, 2010) was used to estimate model fit and parameter estimates for the hypothesized paths. A path analysis approach was used instead of latent variable modeling given limitations of sample size and the desire to achieve model parsimony. Full information maximum likelihood (FIML) estimation was used to handle missing data and to take full advantage of the available data in our model (Enders, 2010). Several indices were used to assess goodness of fit (Byrne, 2001). Fit indices with a value greater than .90 or .95 for the comparative fit index (CFI), less than .08 or .05 for the root mean square error of approximation (RMSEA), and at or below .08 or .05 for the standardized root mean square residual (SRMR) were deemed an acceptable or excellent fit, respectively (Hu & Bentler, 1999; Kline, 1998; Marsh, Hau, & Wen, 2004).

In an effort to gain a complete picture of the relative importance of predictors of parenting knowledge, we also accounted for other factors that have been theoretically or empirically linked to parenting knowledge or the adolescent-mother relationship. At W1, control variables included general characteristics of the adolescent, including her age and educational attainment (Fry, 1985; Sommers et al., 1993), her previous experience with other children (MacPhee, 2002), and her nativity status (0 = Mexico born, 1 = U.S. born; Bornstein & Cote, 2004b; Zepeda & Espinosa, 1988). At W2, we controlled for the adolescent's role as the child's primary caregiver (East & Felice, 1996) and her attendance in

parenting classes (MacPhee, 2002) because we expected that how much of a role she takes in caring for, or learning about parenting her child, may relate to the support she is provided by her mother figure; the autonomy granted by her mother figure; and aspects of the quality of her relationship with her mother figure (e.g., psychological control). Also, because the mother figure provides a context within which the adolescent gains parenting knowledge, at W2 we also controlled for mother figures' educational attainment and parenting knowledge accuracy, as well as children's developmental outcome scores. Finally, covariances among independent and dependent variables were freely estimated (Muthén & Muthén, 2010).

Describing Adolescent Mothers' Parenting Knowledge Accuracy and Confidence

For the first goal, analyses were conducted to describe adolescents' parenting knowledge accuracy and confidence when their children were 10 months old, the types of errors they made (over- and under-estimations of developmental timing) and their knowledge of specific domains of development (see Table 1 for descriptive statistics and zero-order correlations). There was not a significant difference in the percentage of adolescents' under- versus over-estimation errors, $t(181) = -1.3, p = .195$. With respect to knowledge accuracy of specific domains of child development (see Table 1), results of a repeated measures ANOVA revealed that adolescents' knowledge accuracy in all domains differed significantly from one another; knowledge of cognitive development was greatest, followed by social, language, and motor development, $F(3, 175) = 82.79, p < .001$. Concerning confidence in their knowledge, adolescents' confidence about cognitive and language development was significantly different than that for all other domains, $F(3, 179) = 11.91, p < .001$, with the least confidence displayed for cognitive development, and the most confidence for language development. Small cell sizes precluded us from conducting multivariate analyses on under- and over-estimation data by developmental domain, but descriptively these data indicated that adolescents were most likely to under-estimate the timing of motor milestones and to overestimate the timing of social milestones.

Adolescents' accuracy concerning social developmental milestones was significantly related to their children's higher subsequent W3 developmental functioning (i.e., Bayley MDI scores), whereas confidence of cognitive developmental knowledge was related concurrently to higher W2 developmental functioning (see Table 1). With respect to differences in adolescents' knowledge as a function of nativity, findings revealed significant nativity group differences in adolescents' under-estimation errors and their accuracy concerning the social domain of child development, even after controlling for mother figures' highest level of education. Specifically, foreign-born adolescents made significantly more under-estimation errors than U.S. born adolescents, $F(1, 178) = 10.33, p < .01$, and had significantly less accuracy concerning children's social development than those born in the U.S., $F(1, 178) = 4.28, p < .05$. Partial correlations, controlling for mother figures' level of education, revealed that the number of years adolescents' lived in the U.S. was also negatively related to under-estimation errors, $r(134) = -.28, p < .001$.

Examining the Relation between Adolescent Parenting Predictors and Child Developmental Outcomes via Adolescents' Knowledge Accuracy and Confidence

Correlations among study variables were estimated in Mplus and are presented in Table 2. The hypothesized model (see Figure 2) examined whether adolescents' parenting support and resources at W2 predicted child developmental outcomes at W3 via adolescents' accurate knowledge of child development and knowledge confidence at W2. Fit indices for the hypothesized model [$\chi^2(50) = 46.40$, $p = .62$, CFI = 1.00, RMSEA = .00, and SRMR = .04] suggested an excellent model fit. Effect sizes for the standardized beta (b) statistic are presented below, where .10 represents a small effect, .30 represents a medium effect, and .50 represents a large effect (Cohen, 1988).

With respect to covariates in the model, being younger at W1 significantly predicted adolescents' higher perceived instrumental support at W2 ($b = -.28$) and psychological control from her mother figure at W2 ($b = -.20$), which represent small effects. Adolescents' higher levels of educational attainment (W1) significantly predicted higher levels of perceived instrumental support (W2) and autonomy received from her mother figure (W2; $b = .34$ and $.33$, respectively), representing large effects; and mother figures' educational attainment (W1) positively predicted adolescents' reports of mother figures' autonomy-granting behaviors (W2; $b = .17$), representing a small effect. Adolescents who reported taking on the primary caretaking responsibilities for their child at W2 reported lower levels at W2 of instrumental support and psychological control from their mother figures ($b = -.20$ and $-.18$, respectively), and more autonomy from their mother figure at W2 ($b = .18$), which all represented small effect sizes. Finally, mother figures' knowledge accuracy at W2 was significantly positively related to the adolescents' knowledge accuracy at W2 ($b = .32$), which was a large effect. Notably, the adolescents' exposure to young children in the household at W1 and her reports of parenting education classes at W2 did not inform her knowledge accuracy or confidence at W2. Adolescent nativity was not associated with W3 child developmental functioning.

Significant paths indicated that, consistent with the primary hypothesis, adolescents' support and resources significantly predicted child developmental outcomes via adolescents' knowledge accuracy, although this was not the case for knowledge confidence. These relations all suggested small effects. Specifically, whereas adolescent perceptions of instrumental support received from their mother figures were positively related to adolescents' knowledge accuracy at W2 ($b = .19$), adolescent-reported emotional support from the mother figure was negatively related to her knowledge confidence at W2 ($b = -.25$). In addition, although adolescent reports of psychological control were negatively related to the adolescents' knowledge accuracy ($b = -.22$), her reports of autonomy-granting from the mother figure were positively related to adolescents' knowledge confidence ($b = .26$).

Finally, to address our third aim, we examined whether both adolescent mothers' knowledge accuracy *and* confidence prospectively predicted their children's developmental functioning at age two, accounting for children's development at 10 months. Findings revealed that adolescents' greater knowledge accuracy at W2 was a significant predictor of child developmental functioning at W3 ($b = .20$), controlling for W2 developmental functioning.

Discussion

Parenting knowledge influences parents' beliefs and practices, and their children's subsequent development. Our study makes a significant contribution to research on this construct by (a) providing a thorough description of knowledge accuracy, inaccuracy, and confidence in Mexican-origin adolescent mothers, the largest ethnic population of adolescent mothers in the U.S (National Vital Statistics Report, 2007), (b) identifying contextual factors that inform this dimension of parenting competence, and (c) documenting the direct consequence of adolescents' parenting knowledge on children's later development. Our findings inform interventionists by highlighting critical content areas for parenting education efforts targeting adolescent mothers, and identifying contextual factors that could promote or undermine intervention efforts.

Parenting Knowledge in Adolescent Mothers

Recent work on parenting knowledge in adolescent mothers has moved beyond comparing adolescent with adult mothers and toward examining the nature of adolescent mothers' accuracies and inaccuracies in different parenting knowledge domains (Tamis-LeMonda et al., 2002). Our findings extend this literature. On average, Mexican-origin adolescent mothers in our sample were accurate on 62% of knowledge items, a figure that is within the range of data from other samples of adolescent mothers with reported accuracy percentages between 59% to 76% (Bornstein et al., 2010; East & Felice, 1996). Consistent with previous work (see Tamis-LeMonda et al., 2002 for a review), we found both errors of over-estimations (i.e., expecting too much, too soon) and under-estimations (i.e., expecting too little, too late). However, it is notable that adolescents' under-estimations were significantly negatively correlated to their children's subsequent developmental functioning, which supports the notion that parents who under-estimate the developmental timing of milestones could undermine children's development by providing less appropriate stimulation than necessary to facilitate their children's emerging abilities (Coley & Chase-Lansdale, 1998; MacPhee, 2002).

We also found meaningful differences in adolescents' knowledge accuracy and confidence concerning specific domains of child development. Interestingly, adolescents had the most *accurate* knowledge of cognitive development, but the least *confidence* in their knowledge in this domain, suggesting that they may not have a strong awareness of what they do and do not know about children's cognitive development. One can speculate that cognitive development consists of more abstract constructs, and that development in this domain is less obvious or visible to the parent. It might also be that, given their relative young age and limited education, adolescents feel less confident about aspects of their own intellectual development, which may affect their confidence in their knowledge of their children's cognitive development. Furthermore, these findings offer some clarity on our conceptualization of knowledge confidence by suggesting that, in contrast to knowledge accuracy, *more* confidence may not always be a good thing. Our findings support MacPhee's (2002) notion that knowledge accuracy and confidence provide distinctly meaningful dimensions of parenting knowledge, and an important direction for future research is to understand the different factors that are linked to these dimensions. For example, although

knowledge confidence is not directly linked to children's development, it may promote other domains of positive development for the adolescent mother.

Contrary to our expectations, and inconsistent with Tamis-LeMonda et al.'s (2002) report of greater accuracy regarding cognitive, language, and (in particular) motor abilities than social and play skills among low-income adolescent mothers, Mexican origin adolescents' knowledge of motor development was the *least* accurate. This finding is intriguing, especially in light of Tamis-LeMonda et al.'s (2012) recent finding that *fine* motor skills, in particular, may be a strength in this population, as Mexican American mothers used significantly more gestural language than spoken language with their infants in comparison to Dominican and African American mothers, and that their infants subsequently showed superior fine motor skills (action sequencing) at two years. Our discrepant findings may be due to the fact that we had relatively fewer items per domain in the KIDI than the measure that was developed specifically for this purpose by Tamis-LeMonda and colleagues (2002), and the KIDI's inclusion of both gross and fine motor items. Together, these findings may illustrate that adolescent mothers may not be entirely aware of what they do and do not know (or what they are doing well), and thus need help in identifying areas of strength and weakness in their parenting skills.

Our findings also support those from previous work regarding nativity and mothers' parenting knowledge. Adolescents who were born in the U.S. had significantly fewer under-estimation errors and more accurate knowledge of children's social development than foreign-born adolescents. Similarly, previous work has found more under-estimation errors among foreign-born than U.S.-born Hispanic adult mothers (Zepeda & Espinosa, 1988), and less accurate knowledge of social topics like parent-infant relations among immigrant adult mothers from South America, as compared to European American adult mothers (Bornstein & Cote, 2004b). Moreover, we found that the number of years the adolescent lived in the U.S. was inversely related to her under-estimation errors. Together, these findings support the notion that parents in the U.S. may have greater exposure to information about the correct timing of children's developmental milestones, possibly through greater reliance on formal, published childrearing materials in the U.S. (Bornstein & Cote, 2004b). Given that adolescents' under-estimation errors were significantly negatively related to children's subsequent developmental functioning, these findings highlight that foreign-born adolescent mothers may be a particularly important group to target for intervention, as they may expect too little too late from their child's development, and may not provide adequate stimulation for their children's emerging abilities.

Predictors of Adolescent Mothers' Parenting Knowledge

Turning to the factors that *inform* Mexican-origin adolescent mothers' parenting knowledge, we examined aspects of the adolescent-mother relationship as reported by the adolescent (i.e., social support, autonomy-granting, and psychological control) as predictors of knowledge because prior work has noted that relationships with mother figures play a prominent role in Latina adolescent mothers' adjustment (Contreras et al. 2002). Consistent with Belsky's (1984) model, our findings highlight that parents' perceptions of social support are an important influence on parenting knowledge after the transition to parenthood and

during their first year as parents. Our current findings, which extend previous literature by exploring different dimensions of social support, suggest that adolescents' reports of instrumental, emotional, and companionship support from their mother figures were differentially related to their parenting knowledge. Specifically, in line with our hypothesis, greater instrumental support was positively associated with knowledge accuracy. Adolescents who garner instrumental support are likely benefitting from the direct exposure to instruction and information about child rearing they receive from their mother figures, which translates to adolescents' accurate knowledge of child development. Contrary to our expectations, however, emotional support was negatively associated with knowledge confidence. It may be that adolescents with low confidence in their knowledge about child development perceive themselves to be eliciting greater emotional support from their mother figures, whereas adolescents who feel confident in their knowledge of child development perceive themselves to be eliciting less emotional support. Also contrary to our expectations, adolescents' perceived companionship support did not relate to their knowledge confidence. It may be that companionship support, defined as spending leisurely time with the mother figure, provides the context for instrumental and emotional support to occur within these dyads, but is less directly related to knowledge acquisition.

Our findings concerning the impact of mother figures' socialization practices on adolescent mothers' parenting knowledge offer further information concerning contextual influences on these young mothers. Specifically, we found that adolescents whose mother figures granted greater autonomy had significantly greater confidence in their knowledge of children's development. Thus, consistent with the notion that autonomy development is important to adolescents' self-identity formation (Erikson, 1968) and to self-esteem and ego development (e.g., Gray & Steinberg, 1999), adolescents who perceive themselves to experience greater autonomy may engage in more exploration of their identities *as mothers*, which may result in a greater sense of confidence in that identity.

Our study also revealed that adolescents' reports of mother figures' psychological control undermined adolescents' parenting knowledge accuracy. This finding is consistent with the notion that more authoritarian, controlling styles of parenting may be associated with a reduced sense of adolescent self-determination and self-regulated motivation (e.g., Grolnick, Deci, & Ryan, 1997), and can result in a lack of intention to engage in particular activities (Ryan & Deci, 2000). In the case of adolescent mothers, whose parenting responsibilities may be perceived as burdensome, the reduced sense of self-determination may undermine their desire to take on childrearing activities and, thus, limit their opportunities to gain accurate parenting knowledge.

The Impact of Adolescents' Parenting Knowledge on Child Development

The present findings extend previous work on parenting knowledge in adolescent mothers by not only considering contextual and demographic predictors of this important dimension of parenting competence, but also examining children's outcomes. It is generally assumed that adolescent mothers with more accurate parenting knowledge have children with better developmental outcomes (Sommer et al., 1993). Given the decline after the first year in developmental functioning of children of adolescent mothers (Furstenberg et al., 1987;

Moore et al., 1997; Whitman et al., 2001), we examined whether adolescent mothers' parenting knowledge predicted their children's developmental functioning across this developmental period (i.e., at 2 years of age, controlling for functioning at 10 months of age). Our findings supported this hypothesis such that adolescent mothers with more accurate knowledge had children who demonstrated more positive developmental functioning at 2 years. These findings are consistent with the limited work documenting a positive link between cognitive readiness, measured more broadly, and children's subsequent IQ (Whitman et al., 2001), as well as work on high risk (i.e., low birth weight) infants (Benasich & Brooks-Gunn, 1996; Dichtelmiller et al., 1992).

The present study found that infants' developmental functioning on the Bayley MDI at 10 months was not correlated with that at 2 years of age. This finding is not entirely unexpected, as previous findings have been mixed, with some studies reporting discontinuity between infant Bayley MDI scores with toddler and later scores (see Molfese & Acheson, 1997). Scholars have argued that the structure of intelligence in infancy, particularly the general intelligence factor, may be different than that when children mature and acquire verbal abilities (Molfese & Acheson, 1997). It is also important to consider that other factors may have impacted the link between parenting knowledge and child developmental functioning. The adolescent mother's IQ, for example, was undoubtedly important to both her parenting knowledge as well as her child's cognitive functioning. Previous work has found parent IQ to be associated with both knowledge and child development in adolescent mothers (Whitman et al., 2001). However, even after controlling for the adolescent's IQ level, parenting knowledge, (measured more broadly as cognitive readiness) was found to significantly predict children's subsequent cognitive development (Whitman et al., 2001), suggesting that IQ does not explain the entire process.

Overall, our findings support the notion that parenting knowledge is a critical dimension of parenting competence for adolescent mothers and their children, and underscore the importance of parenting knowledge as a target of parent education classes. Yet, despite the now well-accepted notion that parenting knowledge is important to child outcomes, more work is needed on the effects of interventions targeting this knowledge. There is some evidence of positive effects of home visitation programs on increasing the child development knowledge of adolescent mothers (e.g., Culp et al., 1998; Hammond-Ratzlaff, & Fulton, 2001) and for increasing parents' knowledge of effective parenting strategies (Winter, Morawska, & Sanders, in press). However, some have suggested that simply providing adolescents with information about children's developmental milestones and childrearing practices may be too simplistic and may not strongly influence complex parenting behaviors (Azar et al., 1984); further, parents may forget this information as their child moves past a given developmental stage (Bornstein et al., 2010). Our findings offer some insight not only into the type of information that should be better addressed by interventions for Mexican-origin adolescents, but also about how the familial context may help or undermine adolescents' efforts to gain parenting knowledge.

Limitations and Future Directions

Several limitations of our study provide direction for future research. First, because we did not measure parenting behaviors directly, we cannot explain the mechanism by which knowledge impacts child development. Future work should examine the direct link between parenting knowledge, parenting behaviors, and multiple dimensions of child outcomes (e.g., cognitive and social-emotional). Future studies of parenting knowledge would also benefit from further exploration of the construct of knowledge confidence, given the limited research on this aspect of knowledge. In this study, we inferred lack of confidence when adolescents answered “not sure” to a particular question (MacPhee, 2002). Although it was a strength of the study to include this understudied construct in our model, future work should directly ask parents how confident they feel about their answers to individual items on the knowledge questionnaire.

Because our study examines these processes in a specific population of adolescent mothers (i.e., Mexican-origin 15 to 19 year olds living in a southwest metropolitan area), it will also be important to extend this work to other populations to better understand these processes among adolescent mothers in different geographical and socio-cultural contexts (e.g., rural areas, established versus new immigrant contexts) who, for example, may have different access to parenting information or support networks. Given the limitations of our sample size and the number of parameters being estimated, multi-group analyses were not possible in the present study. Future work, however, should test whether the processes in the present study function similarly across different nativity or immigration status groups, for example.

Finally, more research is needed to understand how mother figures' beliefs and perceptions of the adolescent mother inform their own behaviors with adolescent mothers. For example, it may be that mother figures adjust their behaviors to adolescents' levels of functioning or involvement in parenting; thus, future work should explore what informs the choices mother figures make regarding their interactions with adolescent mothers.

Conclusion

Our study makes an important contribution to our knowledge of factors affecting adolescent mothers' parenting knowledge. After taking into consideration the adolescent's age, role as a primary caregiver, and both the adolescent's and mother figure's educational attainment, our findings revealed that adolescents' parenting knowledge was promoted by a supportive, non-controlling parent-adolescent relationship that encouraged adolescent mothers' autonomy development. Our study informs interventions serving Mexican-origin adolescent mothers as to the content on which to focus educational efforts, and on the characteristics of adolescents who should be the focus of such efforts.

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References

- Allen JP, Hauser ST, Eickholt C, Bell KL. Autonomy and relatedness in family interactions as predictors of expressions of negative adolescent affect. *Journal of Research on Adolescence*. 1994; 4:535–552.10.1207/s15327795jra0404_6
- Azar ST, Robinson DR, Hekimian E, Twentyman CT. Unrealistic expectations and problem-solving ability in maltreating and comparison mothers. *Journal of Consulting and Clinical Psychology*. 1984; 52:687–691.10.1037/0022-006X.52.4.687 [PubMed: 6470295]
- Bámaca-Colbert MY, Umaña-Taylor AJ, Gayles JG. A Developmental-contextual Model of Depressive Symptoms in Mexican-Origin Girls. *Developmental Psychology*. 2012; 48:406–421.10.1037/a0025666 [PubMed: 21967564]
- Barber BK. Parental psychological control: Revisiting a neglected construct. *Child Development*. 1996; 67:3296–3319.10.1111/j.1467-8624.1996.tb01915.x [PubMed: 9071782]
- Barber BK, Stolz HE, Olsen JA, Collins WA, Burchinal M. Parental support, psychological control, and behavioral control: Assessing relevance across time, culture, and method. *Monographs of the society for research in child development*. 2005 0.1177/0192513X06289649.
- Bayley, N. Bayley Scales of Infant Development. Second. San Antonio, TX: The Psychological Corporation; 1993.
- Belsky J. The determinants of parenting: A process model. *Child Development*. 1984; 55:83–96.10.1111/j.1467-8624.1984.tb00275.x [PubMed: 6705636]
- Benasich AA, Brooks-Gunn J. Maternal attitudes and knowledge of child-rearing: Associations with family and child outcomes. *Child Development*. 1996; 67:1186–1205.10.1111/j.1467-8624.1996.tb01790.x [PubMed: 8706517]
- Bogat GA, Caldwell RA, Guzmán RA, Galasso L, Davidson WS. Structure and stability of maternal support among pregnant and parenting adolescents. *Journal of Community Psychology*. 1998; 26:549–568.10.1002/(SICI)1520-6629(199811)26:6<549::AID-JCOP3>3.0.CO;2-7
- Bornstein MH, Cote LR. Mothers' parenting cognitions in cultures of origin, acculturating cultures, and cultures of destination. *Child Development*. 2004a; 75:221–235.10.1111/j.1467-8624.2004.00665.x [PubMed: 15015686]
- Bornstein MH, Cote LR. “Who Is Sitting Across From Me?” Immigrant Mothers' Knowledge of Parenting and Children's Development. *Pediatrics*. 2004b; 114:557–564.10.1542/peds.2004-0713
- Bornstein MH, Cote LR, Haynes OM, Hahn C, Park Y. Parenting knowledge: Experiential and sociodemographic factors in european american mothers of young children. *Developmental Psychology*. 2010; 46:1677–1693.10.1037/a0020677 [PubMed: 20836597]
- Bornstein MH, Hahn CS, Haynes OM, Belsky J, Azuma H, Kwak K, de Galperín CZ. Maternal personality and parenting cognitions in cross-cultural perspective. *International Journal of Behavioral Development*. 2007; 31(3):193–209.10.1177/0165025407074632
- Bronfenbrenner, U. Ecological systems theory. In: Vasta, R., editor. *Annals of Child Development*. Vol. 6. London: JAI Press; 1989. p. 187-249.
- Brooks-Gunn, J.; Chase-Lansdale, P. Adolescent parenthood. Bornstein, MH., editor. Hillsdale, NJ: Lawrence Erlbaum; 1995.
- Buriel R. Childrearing orientations in Mexican American families: The influence of generation and sociocultural factors. *Journal of Marriage and the Family*. 1993:987–1000.10.2307/352778
- Byrne, B. Structural Equation Modeling with AMOS: Basic Concepts, Applications and Programming. Mahwah NJ: Lawrence Erlbaum; 2001.
- Cauce, AM.; Domenech-Rodriguez, M. Latino families: Myths and realities. In: Contreras, JM.; Kerns, KA.; Neal-Barnett, AM., editors. *Latino children and families in the United States*. Westport, CT: Praeger Press; 2002. p. 5-25.
- Cohen, J. Statistical power analysis for the behavioral sciences. 2nd. Hillsdale, NJ: Lawrence Erlbaum; 1988.

- Cohen J. A power primer. *Psychological Bulletin*. 1992; 112:155–159.10.1037/0033-2909.112.1.155 [PubMed: 19565683]
- Coley RL, Chase-Lansdale P. Adolescent pregnancy and parenthood: Recent evidence and future directions. *American Psychologist*. 1998; 53:152–166.10.1037/0003-066X.53.2.152 [PubMed: 9491745]
- Collins WA, Laursen B, Mortensen N, Luebker C, Ferreira M. Conflict processes and transitions in parent and peer relationships: Implications for autonomy and regulation. *Journal of Adolescent Research*. 1997; 12:178–198.10.1177/0743554897122003 [PubMed: 19802356]
- Contreras, JM.; Narang, D.; Ikhlas, M.; Teichman, J. A conceptual model of the determinants of parenting among Latina adolescent mothers. In: Contreras, JM.; Kerns, KA.; Neal-Barnett, AM., editors. *Latino children and families in the US*. Westport, CT: Praeger; 2002. p. 155-177.
- Culp AM, Culp RE, Blankemeyer M, Passmark L. Parent education home visitation program: Adolescent and nonadolescent mother comparison after six months of intervention. *Infant Mental Health Journal*. 1998; 19:111–123.10.1002/(SICI)1097-0355(199822)19:2<111::AID-IMHJ3>3.0.CO;2-R [PubMed: 12294463]
- Damast AM, Tamis-LeMonda CS, Bornstein MH. Mother-Child Play: Sequential Interactions and the Relation between Maternal Beliefs and Behaviors. *Child Development*. 1996; 67:1752–1766.10.2307/1131729 [PubMed: 8890505]
- Deutsch FM, Ruble DN, Fleming A, Brooks-Gunn J, Strangor C. Information-seeking and maternal self-definition during the transition to motherhood. *Journal of Personality and Social Psychology*. 1988; 55:420–431.10.1037//0022-3514.55.3.420 [PubMed: 3171914]
- Dichtelmiller M, Meisels SJ, Plunkett JW, Bozynski MEA, Claflin C, Mangelsdorf SC. The relationship of parental knowledge to the development of extremely low birth weight infants. *Journal of Early Intervention*. 1992; 16:210–220.10.1177/105381519201600302
- Dunkel-Schetter, C.; Sagrestano, LM.; Feldman, P.; Killingsworth, C.; Pierce, GR.; Sarason, BR.; Sarason, IG. *Handbook of social support and the family*. New York: Plenum; 1996.
- East, PL.; Felice, ME. *Adolescent pregnancy and parenting: Findings from a racially diverse sample*. Mahwah, NJ: Lawrence Erlbaum Associates Publishers; 1996.
- Enders, C. *Applied missing data analysis*. New York, NY: The Guilford Press; 2010.
- Erikson, EH. *Identity: Youth and crisis*. New York: Norton; 1968.
- Fry PS. Relations between teenagers' age, knowledge, expectations and maternal behaviour. *British Journal of Developmental Psychology*. 1985; 3:47–55.10.1111/j.2044-835X.1985.tb00954.x
- Furstenberg, FF.; Brooks-Gunn, J.; Morgan, SP. *Adolescent mothers in later life*. New York: Cambridge University Press; 1987.
- Grau, JM.; Azmitia, M.; Quattlebaum, J. Latino families: Parenting, relational, and developmental processes. In: Villarruel, FA.; Carlo, G.; Grau, J.; Azmitia, M.; Cabrera, N.; Chahin, TJ., editors. *Handbook of US Latino Psychology: Developmental and community based perspectives*. Los Angeles: Sage; 2009. p. 153-169.
- Gray M, Steinberg L. Unpacking authoritative parenting: Reassessing a multidimensional construct. *Journal of Marriage and the Family*. 1999; 61:574–587.10.2307/353561
- Grolnick, WS.; Deci, EL.; Ryan, RM. Internalization within the family: The self determination perspective. In: Grusec, JE.; Kuczynski, L., editors. *Parenting and children's internalization of values: A handbook of contemporary theory*. New York: Wiley; 1997. p. 135-161.
- Hammond-Ratzlaff A, Fulton A. Knowledge gained by mothers enrolled in a home visitation program. *Adolescence*. 2001; 36:435–442. [PubMed: 11817626]
- Harkness, S.; Super, CM. Culture and parenting. In: Bornstein, M., editor. *Handbook of Parenting*. New Jersey: Lawrence Erlbaum Associates; 2002. p. 53-280.
- Hu LT, Bentler PM. Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling*. 1999; 6:1–55.10.1080/10705519909540118
- Kline, RB. *Principles and practices of structural equation modeling*. New York: Guilford; 1998.
- Knight, GP.; Roosa, MW.; Umaña-Taylor, AJ. Studying ethnic minority and economically disadvantaged populations: Methodological challenges and best practices. *American Psychological Association*; 2009.

- MacPhee, D. Knowledge of Infant Development Inventory: Manual. Colorado: Colorado State University; 2002. first published 1981
- Marsh HW, Hau Kit-Tai, Wen Z. In search of golden rules: Comment on hypothesis-testing approaches to setting cutoff values for fit indexes and dangers in overgeneralizing Hu and Bentler's (1999) findings. *Structural Equation Modeling*. 2004; 11:320–341.
- McGillicuddy-De Lisi, AV.; Sigel, IE. Parental beliefs. In: Bornstein, MH., editor. *Handbook of parenting: Vol 3 Status and social conditions of parenting*. Hillsdale, NJ: Erlbaum; 1995. p. 333-358.
- Miller SA. Parents' beliefs about children's cognitive development. *Child Development*. 1988; 59:259–285.10.2307/1130311
- Molfese VJ, Acheson S. Infant and preschool mental and verbal abilities: How are infant scores related to preschool scores? *International Journal of Behavioral Development*. 1997; 20:595–607.10.1080/016502597385072
- Moore, KA.; Morrison, DR.; Greene, AD. Effects on the children born to adolescent mothers. In: Maynard, RA., editor. *Kids having kids: Economic costs and social consequences of teen pregnancy*. Washington, DC: Urban Institute Press; 1997. p. 145-180.
- Muthén, LK.; Muthén, BO. *Mplus user's guide* (Sixth edition). Los Angeles, CA: Muthén & Muthén; 2010.
- Nath PS, Borkowski JG, Whitman TL, Schellenbach CJ. Understanding adolescent parenting: The dimensions and functions of social support. *Family Relations: An Interdisciplinary Journal of Applied Family Studies*. 1991; 40:411–420.10.2307/584898
- National Vital Statistics Report. Births: Final data for 2007. 2007. Retrieved from http://www.cdc.gov/nchs/data/nvsr/nvsr54/nvsr54_02.pdf
- O'Callaghan MF, Borkowski JG, Whitman TL, Maxwell SE, Keogh D. A model of adolescent parenting: The role of cognitive readiness to parent. *Journal of Research on Adolescence*. 1999; 9:203–225.10.1207/s15327795jra0902_5
- Peterson GW, Bush KR, Supple A. Predicting adolescent autonomy from parents: Relationship connectedness and restrictiveness. *Sociological Inquiry*. 1999; 69:431–457.10.1111/j.1475-682X.1999.tb00880.x
- Rook, KS.; Underwood, LG. Social support measurement and interventions: Comments and future directions. In: Cohen, S.; Underwood, LG.; Gottlieb, BH., editors. *Social support measurement and intervention*. New York: Oxford University Press; 2000. p. 311-334.
- Ryan RM, Deci EL. Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*. 2000; 55:68–78.10.1037//0003-066X.55.1.68 [PubMed: 11392867]
- Ryan, S.; Franzetta, K.; Manlove, J. Hispanic teen pregnancy and birth rates: Looking behind the numbers (Research Brief). Washington, DC: Child Trends; 2005.
- Sartor CE, Youniss J. The relationship between positive parental involvement and identity achievement during adolescence. *Adolescence*. 2002; 37:221–234. [PubMed: 12144156]
- Schaefer ES. Children's reports of parental behavior: An inventory. *Child Development*. 1965; 36:413–424.10.2307/1126465 [PubMed: 14300862]
- Sherbourne CD, Stewart AL. The MOS social support survey. *Social Science Medicine*. 1991; 32:705–714.10.1016/0277-9536(91)90150-B [PubMed: 2035047]
- Sommer K, Whitman TL, Borkowski JG, Schellenbach C, Maxwell S, Keogh D. Cognitive readiness and adolescent parenting. *Developmental Psychology*. 1993; 29:389–398.10.1037/0012-1649.29.2.389
- Steinberg L, Lamborn SD, Darling N, Mounts NS. Over-time changes in adjustment and competence among adolescents from authoritative, authoritarian, indulgent, and neglectful families. *Child Development*. 1994; 65:754–770.10.2307/1131416 [PubMed: 8045165]
- Stevens JH. Child development knowledge and parenting skills. *Family Relations*. 1984; 33:237–244.10.2307/583789
- Supple A, Ghazarian S, Peterson G, Bush K. Assessing the cross-cultural validity of a parental autonomy granting measure: Comparing adolescents in the U.S., China, Mexico and India. *Journal of Cross-Cultural Psychology*. 2009; 40:816–833.10.1177/0022022109339390

- Tamis-LeMonda CS, Song L, Leavell AS, Kahana-Kalman R, Yoshikawa H. Ethnic differences in mother–infant language and gestural communications are associated with specific skills in infants. *Developmental Science*. 2012; 15:384–397.10.1111/j.1467-7687.2012.01136.x [PubMed: 22490178]
- Tamis-Lemonda C, Shannon J, Spellmann M. Low-income adolescent mothers' knowledge about domains of child development. *Infant Mental Health Journal*. 2002; 23:88–103.10.1002/imhj.10006
- Toomey RB, Umaña-Taylor AJ, Jahromi LB, Updegraff KA. Measuring social support from mother figures in the transition from pregnancy to parenthood among Mexican-origin adolescent mothers. *Hispanic Journal of Behavioral Sciences*. 2013; 35:194–212.10.1177/0739986312470636 [PubMed: 23729988]
- Umaña-Taylor AJ, Updegraff KA, White RB, Herzog MJ, Pflieger JC, Madden-Derdich D. Developing and testing a measure of social support with Mexican-origin pregnant adolescents and their mother figures. *Hispanic Journal of Behavioral Sciences*. 2011; 33:377–397.10.1177/0739986311412930
- Villarreal R, Blozis SA, Widaman KF. Factorial invariance of a Pan-Hispanic familism scale. *Hispanic Journal of Behavioral Sciences*. 2005; 27:409–425.10.1177/0739986305281125
- Whitman, TL.; Borkowski, JG.; Keogh, D.; Weed, K. *Interwoven lives: Adolescent mothers and their children*. Mahwah, NJ: Erlbaum; 2001.
- Whitman TL, Borkowski JG, Schellenbach CJ, Nath PS. Predicting and understanding developmental delay of children of adolescent mothers: A multi-dimensional approach. *American Journal of Mental Deficiency*. 1987; 92:40–56.10.1037/0893-3200.19.2.263 [PubMed: 2441600]
- Winter L, Morawska A, Sanders MR. The effect of behavioral family intervention on knowledge of effective parenting strategies. *Journal of Child and Family Studies*. in press. 10.1007/s10826-011-9548-y
- Zepeda M, Espinosa M. Parental knowledge of children's behavioral capabilities: A study of low income parents. *Hispanic Journal of Behavioral Sciences*. 1988; 10:149–159.10.1177/07399863880102005

Figure 1.
Theoretical model.

Figure 2.

Parenting resources predicting child developmental outcomes via parenting knowledge. Covariances among all independent variables and among all dependent variables were estimated. Only significant paths are presented for ease of presentation. Wave 2 child developmental functioning does not appear in the model because it did not significantly covary with any exogenous variables, nor predict W3 child developmental functioning. Analysis is based on the full sample size of $N = 191$ given the use of full information maximum likelihood methods, which makes use of complete and incomplete observations to inform parameter estimates. MF = Mother Figure; W1 = Wave 1; W2 = Wave 2; W3 = Wave 3. * $p < .05$. ** $p < .01$. *** $p < .001$.

Table 1
Descriptive Statistics for Adolescent Reported Knowledge of Infant Development (KIDI)
and Correlations with Child Developmental Functioning at Wave 2 ($N = 171$) and Wave 3
($N = 140$)

W2 KIDI Subscale	Mean (<i>SD</i>)	Correlation with Child Developmental Functioning ^e	
		W2	W3
Accuracy^a	.62 (.13)	.11	.24**
Cognitive Domain	.80 (.23)	.07	.05
Language Domain	.57 (.24)	.02	.16
Motor Domain	.49 (.20)	.07	.10
Social Domain	.66 (.22)	.02	.25**
Confidence^b	.88 (.13)	.12*	.07
Cognitive Domain	.82 (.24)	.19*	.07
Language Domain	.92 (.17)	-.04	.11
Motor Domain	.90 (.16)	.08	-.02
Social Domain	.89 (.16)	.09	.04
Underestimations^c	.20 (.10)	-.06	-.23*
Cognitive Domain	.04 (.08)	.00	-.11
Language Domain	.18 (.16)	-.12	-.10
Motor Domain	.43 (.17)	-.05	-.17*
Social Domain	.11 (.17)	.05	-.06
Overestimations^d	.18 (.12)	-.06	-.08
Cognitive Domain	.11 (.17)	-.02	-.02
Language Domain	.17 (.20)	.02	-.03
Motor Domain	.09 (.13)	-.05	.09
Social Domain	.23 (.21)	-.05	-.19*

Note.

^a Accuracy = proportion correct/attempts;

^b Confidence = proportion attempted/total;

^c Underestimations = proportion underestimated/attempts;

^d Overestimations = proportion overestimated/attempts;

^e Child Developmental Functioning measured with Bayley Mental Development Index; W2 = Wave 2; W3 = Wave 3. Information from the full model using full information maximum likelihood procedures were incorporated when available.

* p<.05.

** p<.01.

Table 2
Zero-order correlations, Means, and Standard Deviations (SD) for Primary Study Variables and Covariates (N = 191)^a

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Wave 1																	
1. Age ^b	-																
2. Education	.72***	-															
3. MF Education	.18**	.15*	-														
4. Nativity ^c	.02	.10	.25***	-													
5. Exposure to Children	.02	.05	-.13*	-.11	-												
6. Parenting Classes	-.05	.04	.06	-.06	-.20**	-											
Wave 2																	
7. Primary Caregiving	.12*	.10	.07	-.14*	.10	.05	-										
8. Instrumental Support	-.04	.13*	.08	.07	.04	.04	-.19***	-									
9. Emotional Support	.03	.04	-.01	-.01	.10	.02	-.02	.67***	-								
10. Crpanship. Support	.13*	.16*	.05	.02	.14*	.02	-.08	.58***	.70***	-							
11. Autonomy	.21**	.31***	.21**	.07	-.01	.04	.22**	.43***	.48***	.42***	-						
12. Psychological Control	-.15*	-.07	.04	.13*	.04	.08	-.19***	-.21**	-.33***	-.23***	-.34***	-					
13. Kwldg. Accuracy	.05	.13*	.05	.10	-.07	-.02	.06	.13*	.03	.03	.21**	-.21**	-				
14. Kwldg. Confidence	.06	-.01	.01	-.02	.03	.03	.05	.07	.03	.11	.21**	-.15*	.11	-			
15. MF Kwldg. Accuracy	.04	-.07	.15*	.13*	.04	-.06	.02	-.05	-.02	-.07	.03	.12*	.28***	.05	-		
16. C Child Development	.12*	.13*	.06	-.15*	-.17**	.04	.11	-.08	-.09	.01	.09	-.14*	.11	.12*	.07	-	
Wave 3																	
17. C Child Development	.10	.14*	.04	.08	-.05	-.07	-.01	.16*	.12*	.08	.15*	-.14*	.24***	.07	.14*	.07	-
Mean	16.26	9.68	9.04	.63	.61	.96	4.21	4.42	3.90	3.36	3.13	2.33	.62	.88	.63	93.67	83.76
SD	.96	1.21	3.33	.48	.94	1.29	.68	.75	1.05	1.06	.53	.73	.13	.13	.12	7.09	11.61

Note:

^a Full sample size (N = 191) is provided using FIML, which makes use of complete and incomplete observations to inform parameter estimates.

^b All variables are adolescent report, except those marked MF (Mother Figure) and C (Child);

^c 0 = Mexico-born adolescent, 1 = U.S. born adolescent.

* $p < .05$.

** $p < .01$.

*** $p < .001$.