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ORIGINAL ARTICLE

The effect of mothers' emotion-related responses to adolescent disclosures and adolescent perspective taking on the timing of future disclosures

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Abstract

Adolescent disclosure to parents is an important feature of high-quality parent-adolescent relationships and is associated with positive adolescent adjustment. However, no studies have examined parental emotion-related responses (ERRs) to disclosures and adolescent dispositional characteristics that may facilitate or inhibit adolescent disclosures during real-time conversations. The present study tested (a) which maternal ERRs to adolescent disclosures predicted quicker subsequent disclosures during mother-adolescent conversations, and (b) whether adolescent perspective taking moderated these associations. Adolescent disclosures and maternal ERRs were coded moment-to-moment during a problem-solving discussion and adolescents reported on their perspective taking. Multilevel Generalized Linear Mixed-Effects Models revealed that maternal interest and validation predicted the shortest lag times compared with other maternal ERRs, controlling for adolescent age, gender, total durations of maternal ERRs, and total frequency and duration of adolescent disclosures. Adolescent perspective taking moderated associations between maternal ERRs to adolescent disclosures and lag times. Specifically, adolescents high in perspective taking were most likely to make quicker subsequent disclosures when mothers responded to disclosures with

interest. This is the first study to examine how contingent parental responses to adolescent disclosures in real time affect the timing of subsequent disclosures during parent-adolescent conversations.

KEY WORDS

disclosure, emotion socialization, observational methods, parent-adolescent interactions, parental responses to children's emotions, perspective taking

1 | INTRODUCTION

The way parents respond to their children's emotions, concerns, and behavior is a crucial component of socialization (Eisenberg, Cumberland, & Spinrad, 1998; Saarni, 1999; Thompson & Meyer, 2007). These responses are central to socialization in early development, but retain importance in adolescence when disclosure to parents declines (Smetana, Villalobos, Tasopoulos-Chan, Gettman, & Campione-Barr, 2009), making it more difficult for parents to provide adequate emotional support. According to dynamic systems' perspectives, interpersonal patterns of socialization between parents and children become characteristic of relationships and influence behavior over time (Granic, 2000; Lougheed, Hollenstein, Lichtwarck-Aschoff, & Granic, 2015; Main, Paxton, & Dale, 2016). Indeed, specific parental responses are better predictors of child outcomes than general parenting style or overall relationship quality (Fabes, Leonard, Kupanoff, & Martin, 2001; Gottman, Katz, & Hooven, 1996). Thus, it is important to examine real-time parental responses to their adolescents' behaviors to inform more targeted interventions with families.

The present study used a dynamic, observational methodology to examine how contingent parental responses to adolescent disclosures in real time affect the timing of future disclosures during parent-adolescent conversations. Because adolescents' appreciation of parents' goals may influence associations between maternal and adolescent behavior, we also examined whether adolescents' ability to take their parents' perspective moderated associations between parental responses to their disclosures and the timing of future disclosures. Specifically, we tested (a) which maternal emotion-related responses (ERRs) to adolescent disclosures predicted quicker subsequent disclosures during mother-adolescent conversations, and (b) whether adolescent perspective taking moderated these associations.

1.1 | Parental responses to children's and adolescents' emotions

There are two main types of parental responses to children's emotions that have been examined in the literature: unsupportive and supportive. Unsupportive responses generally consist of negative affect, including distress (Gamache Martin, Kim, & Freyd, 2018), punishment (Tao, Zhou, & Wang, 2010), minimization (Eisenberg & Fabes, 1994), and suppression (Gross & Levenson, 1993). Unsupportive responses are associated with negative child outcomes, including poorer emotion regulation (Eisenberg & Fabes, 1994; Gottman et al., 1996), lower empathy (Eisenberg, Fabes, Schaller, Carlo, & Miller, 1991), poorer social competence (Denham, Mitchell-Copeland, Strandberg, Auerbach, & Blair, 1997), greater disorganized behavior (Roberts & Strayer, 1987), and more internalizing (Sanders, Zeman, Poon, & Miller, 2015) and externalizing problems (Eisenberg, Cumberland et al., 2001). These effects are thought to be because parental responses to children's emotions affect their emotional security (Davies & Cummings, 1994; Eisenberg et al., 1998), which in turn influences their behavior during social interactions and subsequent adjustment.

On the contrary, supportive parental responses include validation, reappraisal, emotional attunement, and positive emotional directives (Gottman et al., 1996; Loughheed et al., 2015; Soenens, Duriez, Vansteenkiste, & Goossens, 2007). In contrast to negative responses, supportive parental responses to children's emotions are associated with better emotional and social competence (Eisenberg et al., 1991; Fabes et al., 2001; Soenens et al., 2007). Parents who react supportively to their children's emotions are often successful at managing their own emotions (Bariola, Gullone, & Hughes, 2011), are attuned and sensitive to their children's needs in the moment, and are able to take their child's perspective and empathize with him/her (Miklikowska, Duriez, & Soenens, 2011). Such parental attunement likely facilitates better emotional self-awareness and emotion regulation in children and adolescents (Eisenberg et al., 1998). These supportive responses go above and beyond general positivity or warmth, as the latter do not necessarily reflect an attuned understanding of the child's emotions in the moment (Gottman et al., 1996). Thus, it is important to not conflate positive affect more generally with specific parental supportive responses.

1.2 | Parental responses to adolescent disclosures

Disclosure is defined as voluntarily or spontaneously providing information about one's thoughts or feelings to another (Stattin & Kerr, 2000). Adolescent disclosure to parents is associated with better behavioral and psychological adjustment (e.g., Hamza & Willoughby, 2011; Laird & Marrero, 2010). Previous research using primarily adolescent and parent self-report has found that the quality of the parent-adolescent relationship is an important predictor of adolescents' tendency to disclose, particularly when adolescents perceive parents as trusting, accepting, warm, and affectionate (e.g., Keijsers, Frijns, Branje, & Meeus, 2009; Smetana, Metzger, & Campione-Barr, 2006). Conversely, when adolescents expect their parents to respond negatively to their disclosures, they are less likely to disclose in the future (Solís, Smetana, & Comer, 2015).

Dynamic transactional theories propose that patterns of behavior during parent-child interactions and expectations about how both parents and children will behave during these interactions are informed by past exchanges (Granic, 2000). Indeed, when adolescents expect their parents to respond positively and supportively to their disclosures, they report feeling more connected to their parents and are more likely to disclose over time (Tilton-Weaver et al., 2010). Conversely, when adolescents expect their parents to respond negatively to their disclosures (e.g., with criticism, disapproval, disappointment, or invalidation), they disclose less. In fact, when adolescents report feeling more controlled and less connected to parents, and parents engage in punitive and minimizing reactions to children's emotions, adolescents are less likely to disclose over time and engage in greater secrecy (Tilton-Weaver et al., 2010). Such negative reactions can promote coercive cycles of interaction (Patterson, 1982), which in turn inhibit future adolescent disclosures.

On the contrary, when parents respond to adolescents' disclosures with validation (i.e., communication of understanding and appreciation, though not necessarily agreement), they are more likely to disclose again in the future. Research has shown that when adolescents perceive parents as accepting of their perspectives, adolescents are more likely to disclose concurrently and over time (Smetana, Metzger, Gettman, & Campione-Barr, 2006). Recent studies using observational methodologies have shown that parental validation is associated with more substantive disclosures (Gamache Martin et al., 2018) and quicker in-the-moment emotional disclosures during parent-adolescent interactions (Main, Loughheed, Disla, & Kashi, 2018), likely because parental validation communicates that adolescents' feelings are important and justified. Such validation can thereby allow adolescents to feel more confident and comfortable disclosing.

Taken together, this research suggests that adolescents' perceptions of positive (e.g., validating) or negative (e.g., criticism) parental responses to their disclosures play an important role in predicting adolescent disclosure over time. However, few studies have examined specific parental behaviors that facilitate or inhibit disclosure. Furthermore, most of the aforementioned studies examined parental responses to adolescent disclosures and whether these responses predicted future adolescent disclosures over longer timescales (for exceptions, see

Gamache Martin et al., 2018; Main et al., 2018). The present study sought to test whether and how parental responses to adolescent disclosures *in the moment* predicted more immediate subsequent disclosures during parent-adolescent conversations. Identifying these patterns of exchange during real-time interactions holds important implications for interventions with families struggling with a lack of disclosure during this important developmental period.

1.3 | The role of adolescent perspective taking

Socialization is a bidirectional and transactional process (Sameroff, 2009) that involves not only parental responses to the child, but also the child's receptiveness to parents' socialization efforts. Children may be more receptive to parental socialization if they understand and appreciate the parents' goals. Such appreciation may be garnered when parents are sensitive and responsive to their children's needs, leading to a pattern of social reciprocity that fosters empathy development (Dunn & Brown, 1994). Indeed, supportive parents foster effective coping strategies and better awareness of the causes and consequences of their children's own emotions (Gottman et al., 1996; Roberts & Strayer, 1987), which may contribute to the development of understanding and appreciation of others' emotions (Schipper & Petermann, 2013). In fact, adolescents demonstrate more empathic accuracy during interactions with their parents when attachment quality is high (Diamond, Fagundes, & Butterworth, 2012), and children demonstrate higher empathy when parents respond to their children's anxiety by encouraging adaptive (i.e., problem-focused) coping strategies (Eisenberg et al., 1991). Furthermore, the development of empathy is an intergenerational process, whereby more supportive parents have children who are more empathic (Soenens et al., 2007).

Empathy is a multidimensional interpersonal construct with affective and cognitive components (see Main, Walle, Kho, & Halpern, 2017), but in the present study, we focused on the cognitive process of perspective taking (i.e., the ability to take another's point of view into consideration). This is because adolescents who can more accurately perceive their parents' intentions during interactions are likely better able to listen to and appreciate the parents' message, especially in the context of conflict (Van Lissa, Hawk, & Meeus, 2017). In fact, dispositional perspective taking, more so than affective measures of empathy, predicts better problem-solving and prosocial conflict resolution with parents over the course of adolescence (Van Lissa, Hawk, Branje, Koot, & Meeus, 2016). Only one recent study to our knowledge has examined links between adolescent disclosure and empathy. This study found that adolescent disclosure about distressing events mediated the relation between mothers' own disclosure and adolescent prosocial behavior (Kil, Grusec, & Chaparro, 2018). Adolescents with better perspective taking may disclose more to parents because they appreciate that the parent wants to engage with them and learn more about their experiences. Furthermore, adolescents high in perspective taking might articulate their point of view more clearly in a way the parent can understand, making it easier for parents to respond supportively to their concerns.

Taken together, this research suggests that open and supportive relationships foster both adolescent disclosure and empathy development. However, no studies to date have examined whether parents' observed responses to adolescent disclosures facilitate further disclosure during real-time interactions, and whether adolescents' dispositional perspective taking moderates the effects of parents' responses to their disclosures.

1.4 | The present study

The present study had two central aims: (a) identify maternal ERRs (negative, positive, validation, interest, and neutral) to adolescent disclosures that predicted quicker subsequent disclosures during mother-adolescent conversations, and (b) determine whether adolescent perspective taking moderated these associations. We hypothesized that maternal validation and interest in response to adolescent disclosures would predict the shortest lag times to subsequent disclosures (i.e., time to the next disclosure) whereas negative affect would predict the

longest lag times. Because validation and interest are important in the context of socialization above and beyond general warmth and positivity (see Gottman et al., 1996), we examined positive affect (e.g., humor, affection) separately. Furthermore, we hypothesized that adolescent perspective taking would moderate associations between maternal ERRs to disclosures and the timing of future disclosures. Specifically, we expected that adolescents higher in perspective taking would disclose again more quickly when parents validated or expressed interest in response to their disclosures compared with adolescents low in perspective taking.

2 | METHOD

2.1 | Participants

Participants were 50 adolescents (30 female; $M_{\text{age}} = 14.84$ years, $SD = 1.99$, range = 13–18 years) and their mothers who participated in a study on mother–adolescent communication (see Main et al., 2016). One dyad was excluded from the analyses due to an error in researcher instruction, resulting in analysis of 49 dyads. The racial/ethnic composition of the sample is as follows: 62% non-Hispanic white, 16% non-Hispanic black, 10% Asian/Pacific Islander, 4% Hispanic, and 8% other. Maternal education ranged from a high school diploma to an advanced graduate degree, with the median highest degree obtained being a bachelor's degree (36.0%). Families' annual income ranged from less than \$25,000 per year to more than \$150,000 per year, with the average family income being \$81,000 to \$100,000.

2.2 | Procedures

The research was approved by the Institutional Review Board at the institution where the research was conducted. Mothers and adolescents were recruited from local communities in the San Francisco Bay Area through schools, teen afterschool programs, parenting groups, and parent newsletters. Mothers and adolescents participated in a 1.5-hr laboratory visit. Mothers and adolescents each independently identified two topics that they felt caused the most disagreement in their relationship using the modified version of the Issues Checklist (Prinz, Foster, Kent, & O'Leary, 1979) and subsequently discussed two of these topics that were rated as most upsetting to them both for 10 min each without a researcher present. Two video cameras (one facing each participant) captured the participants' facial expressions, vocalizations, gestures, and posture. A researcher knocked on the door after 10 min to indicate it was time to switch to the second topic. If fewer than 10 min elapsed after the dyad finished discussing the first topic, they were encouraged to switch to the second topic. Mothers were given a \$20 check, and adolescents were given a \$20 gift card for participating.

2.3 | Measures

2.3.1 | Adolescent disclosure

Parent–adolescent conflict discussions were coded for adolescent disclosures using modified versions of the Couples Interaction Coding (Marsh, Busch, Cowan, & Cowan, 2002) and the Supportive Behavior Coding systems (Allen et al., 2001). The conflict discussion context was chosen as an ecologically valid measure of parent–adolescent communication processes (see Eisenberg et al., 2008) with the goal of eliciting spontaneous disclosures. Adolescent statements were coded as disclosures if the adolescent communicated something that the parent would not have automatically known, that would not necessarily come up in everyday conversation (Marsh, Busch, Cowan, & Cowan, 2002), or that could have been kept secret (Allen et al., 2001). For example, 'It makes me feel upset when you act like you don't trust me' or 'Dad doesn't want to talk to me' would be coded as instances of disclosure. Each discussion was divided into adolescent and mother conversation turns. Each adolescent

conversation turn was rated for whether disclosure occurred for that particular turn. The onset and offset time of each disclosure within each conversation turn was recorded to capture the timing and duration of individual disclosures to allow examination of temporal contingencies between adolescent disclosures and maternal ERRs (see Analytic Plan). Each conversation turn was treated as a new potential opportunity for adolescent disclosure. Therefore, if a topic that had been discussed previously was later elaborated upon, this was coded as a separate instance of disclosure.

Codes were recorded using Mangold INTERACT (version 16). The lead author trained an undergraduate research assistant to reach 75% agreement on training videos over a three-month period prior to the start of coding. Weekly calibration checks were held to discuss any disagreements and minimize coder drift. Interrater reliability was calculated for the agreement on the presence or absence of each disclosure within a 5-s window and was checked across 30% of the videos. The lead author served as the 'gold standard' to which the other observer's codes were compared; thus, the lead author's codes were included in the final analyses for videos that were coded by both observers. Observers had very high agreement on the presence or absence of disclosures (99.69%).

2.3.2 | Maternal ERRs to adolescent disclosures

Maternal ERRs were coded during the discussions with the 16-code version of the Specific Affect Coding System (SPAFF), an observational coding scheme for capturing emotion-related behavior during interpersonal interactions (Coan & Gottman, 2007). The SPAFF is divided into positive, negative, and neutral codes, with specific emotions within each dimension. Codes were determined based on a gestalt of facial expression, verbal content, vocal tone, gestures, and body movements and were assigned in a mutually exclusive and exhaustive manner, meaning that only one code was applied at each time point. To test the study hypotheses, maternal ERRs were collapsed into four categories: negative (e.g., contempt, criticism, sadness), positive (e.g., humor, affection), interest (e.g., open-ended questions, positive nonverbal attention), validation (e.g., direct expressions of understanding, non-verbal back channels), and neutral (see Main et al., 2016).

Mangold INTERACT (version 14) was used to code maternal ERRs. The corresponding author trained a separate team of two undergraduate research assistants to reach 75% agreement across all codes prior to the start of coding. Interrater reliability was based on second-by-second concordance (onset and offset times were required to occur within a 5-s window) between observers' ratings across the interaction. All interactions were coded by both undergraduate research assistants. The corresponding author coded approximately 30% of the videos and served as the 'gold standard' to which the other observers' codes were compared, as recommended by Coan and Gottman (2007). Codes from the undergraduate observers were used in the final analyses. The disclosure and maternal ERR coding teams were blind to each other's ratings. Due to the categorical nature of the data, Cohen's kappa was used to calculate interrater reliability, with a minimum of 0.70 kappa required for data to be included in final analyses; videos were recoded until this reliability criterion was met. Weekly calibration checks and discussions were conducted to minimize coder drift. The average kappa across all codes was 0.77 (range = 0.62–0.88).

2.3.3 | Adolescent perspective taking

The perspective taking subscale of the Interpersonal Reactivity Index (IRI; Davis, 1983) was used to measure adolescent perspective taking. The 28-item IRI is a commonly used measure of distinct components of empathy. Adolescents rated on a scale of 1 (*Does not describe me well*) to 5 (*Describes me very well*) to what degree each statement described them. Sample items include, 'I try to look at everybody's side of a disagreement before I make a decision' and 'When I'm upset at someone, I usually try to 'put myself in his shoes' for a while.' The reliability for the perspective taking subscale for adolescents in the current study was adequate ($\alpha = 0.75$) and consistent with reliabilities found in the previous research using adolescent samples (e.g., Van Lissa et al., 2017).

3 | RESULTS

3.1 | Data setup and analytic plan

Behavioral coding resulted in two continuous streams of data—one for mothers, and one for adolescents. Mothers' time series consisted of mutually exclusive affective states and adolescents' time series consisted of mutually exclusive states of disclosing or not disclosing. This approach allowed us to identify the timing of adolescent disclosures relative to the timing of mothers' ERRs. For each disclosure, the maternal ERR was identified as the last behavior the mother displayed during each instance of adolescent disclosure. Depending on the duration of individual disclosures, mothers often expressed multiple behaviors during the adolescent disclosure; thus, to be considered a response, the maternal behavior needed to occur toward the end of the disclosure. Therefore, the onset of the maternal response could not occur more than one second following the offset of the adolescent disclosure but could overlap with the end of the adolescent disclosure. This approach was taken after the lead and corresponding author viewed several videotapes and agreed that the maternal response to adolescent disclosures was best captured using this procedure. There is no clear consensus in the literature regarding what qualifies as a 'response' using time series data, but generally some degree of temporal overlap is present to ensure confidence in the contingency of behaviors (see Loughheed et al., 2015); thus, maternal responses sometimes overlapped with adolescent disclosures (especially in the case of nonverbally expressed ERRs). The categories of maternal ERRs (negative, positive, validation, interest, and neutral) were dummy coded into 0 and 1 s, allowing for comparisons across maternal response type in the analyses.

The dependent variable in all analyses was the lag time to subsequent adolescent disclosures. To identify lag times, first, each instance of disclosure for each adolescent was identified. Next, the number of seconds until the next disclosure was calculated. This procedure was repeated for each dyad until the last disclosure the adolescent made in the conversation. This resulted in a total of 678 data points and 49 missing cases of data, the latter reflecting the lack of a subsequent disclosure for the final disclosure for each adolescent. Descriptive statistics for study variables (maternal ERRs, disclosure variables, and adolescent perspective taking) are presented in Table 1.

Disclosure declines as adolescents get older (e.g., Smetana et al., 2009) and perspective taking abilities improve with adolescent age (Eisenberg, Zhou, & Koller, 2001). Furthermore, female adolescents disclose more than male adolescents (Papini, Farmer, Clark, Micka, & Barnett, 1990). Indeed, preliminary analyses revealed that older adolescents had longer durations of disclosure compared with younger adolescents ($r = 0.37, p = 0.008$), mothers were more likely to display validation toward older adolescents compared with younger adolescents ($r = 0.29, p = 0.04$), and mothers were more likely to display interest toward girls compared with boys ($t(47) = 2.12, p = 0.04$). Therefore, adolescent age and gender (female = 0, male = 1) were included as covariates. Additionally, to ensure that effects of maternal ERRs were independent of adolescents' overall tendency to disclose and mothers' general emotional behavior, we controlled for total frequency and duration of adolescent disclosure and overall durations of maternal emotional behaviors (i.e., the total number of seconds that mothers expressed each emotional behavior) in the models.

3.2 | Predicting lag time to future adolescent disclosures based on maternal ERRs to previous disclosures

To examine which maternal ERR(s) predicted shorter lag times to subsequent adolescent disclosures, five multi-level generalized linear mixed-effects models using a Poisson distribution were conducted using SPSS (Version 24). In all models, the dependent variable (lag time) was the number of milliseconds until the next disclosure. Thus, a Poisson distribution was considered appropriate because the dependent variable was a count variable whose distribution closely approximated that of a Poisson distribution both visually and numerically (Gardner, Mulvey, &

TABLE 1 Descriptive statistics of maternal emotional responses and adolescent disclosure variables

Variable	Min	Max	M(SD)
Maternal responses			
Negative affect	0	1.00	0.29 (0.27)
Positive affect	0	0.41	0.08 (0.11)
Validation	0	0.58	0.16 (0.16)
Interest	0	0.37	0.11 (0.10)
Neutral affect	0	1.00	0.35 (0.20)
Adolescent disclosure			
Disclosure frequency	2	34	14.51 (7.47)
Disclosure duration (seconds)	14.88	347.15	155.52 (85.80)
Lag time to subsequent disclosure (seconds)	0.07	359.31	25.65 (38.24)
Adolescent perspective taking	1.50	4.83	3.31 (0.65)

Note. Min = minimum, Max = maximum, M = mean, SD = standard deviation. Maternal responses = proportion of maternal responses to adolescent disclosures for each emotion.

Shaw, 1995). Outcome estimates were exponentiated to indicate effect size differences between each maternal ERR and the reference group in seconds.

Using a multilevel modeling framework, family ID was used as a SUBJECTS variable to take into account the repeated measures aspect of the independent (maternal ERRs) and dependent (lag times) variables for each dyad. Each model substituted out one of the maternal ERRs (negative, positive, validation, interest, and neutral) that served as reference group to which all the other maternal responses were compared, resulting in a total of five models. Maternal ERRs were included in each model as fixed effects. Overall adolescent disclosure frequency and duration and the overall duration of each maternal ERR were included in each model as random effects because they were significantly correlated with the dependent variable.

Results of these models are presented in Table 2. Somewhat contrary to hypotheses, when mothers responded to adolescent disclosures with neutral affect, lag times to subsequent disclosures were longest compared with when mothers responded with any of the ERR categories (Model 1). When mothers responded with validation (β_3) or interest (β_4) to adolescent disclosures, adolescents subsequently disclosed about 27 s more quickly for validation and 37 s more quickly for interest, compared with if the mother responded to the previous disclosure with neutral affect. Though significant, the differences between neutral and negative and positive responses were very small (less than one second for negative and less than three seconds for positive; see Model 1, β_1 and β_2). When mothers responded with positive affect, adolescents disclosed more quickly than if mothers responded with negative affect, but only by about two seconds (Model 2, β_1). Both validation and interest yielded significantly shorter lag times compared with negative (Model 2, β_1 and β_2) and positive affect (Model 3, β_1 and β_2). When validation was used as a reference group, interest responses yielded significantly shorter lag times to subsequent disclosures by about 12 s (Model 4, β_1). Thus, maternal interest responses yielded the shortest lag time to subsequent disclosures compared with other maternal ERRs.

3.3 | Interactions between maternal ERRs to disclosures and adolescent perspective taking predicting lag times to subsequent disclosures

To test our second aim of whether adolescent perspective taking moderated associations between maternal responses to adolescent disclosures and lag time to subsequent disclosures, the main effect of adolescent perspective taking and each maternal ERR were included as main effects, and the interaction terms between perspective

TABLE 2 Generalized linear mixed models results for maternal ERRs predicting lag times to subsequent adolescent disclosures

Variable	Estimate (SE)	Effect size (s)	p	95% CI
Model 1: Neutral affect as a reference group				
Fixed effects				
Intercept	11.551 (0.181)		<0.001	[11.195, 11.907]
β_1 Negative response	-0.002 (0.001)	-0.21	0.001	[-0.004, -0.001]
β_2 Positive response	-0.021 (0.001)	-2.27	<0.001	[-0.023, -0.019]
β_3 Validation response	-0.279 (0.001)	-26.59	<0.001	[-0.281, -0.278]
β_4 Interest response	-0.435 (0.001)	-36.64	<0.001	[-0.437, -0.433]
Random effects				
β_5 Adolescent age	0.147 (0.110)	16.45	0.183	[-0.070, 0.364]
β_6 Adolescent gender (0 = female, 1 = male)	-0.185 (0.123)	-17.55	0.135	[-0.426, 0.057]
β_7 Negative (total duration)	-0.001 (0.001)	-0.10	0.527	[-0.002, 0.001]
β_9 Positive (total duration)	-0.000 (0.002)	0	0.807	[-0.004, 0.003]
β_{10} Validation (total duration)	0.001 (0.001)	0.11	0.482	[-0.002, 0.004]
β_{11} Interest (total duration)	0.000 (0.001)	0	0.801	[-0.002, 0.002]
β_{12} Disclosure frequency	-0.064 (0.009)	-6.44	<0.001	[-0.082, -0.046]
β_{1013} Disclosure duration	-0.002 (0.001)	-0.22	0.037	[-0.003, -0.000]
Model 2: Negative affect as a reference group				
Intercept	11.550 (0.183)		<0.001	[11.191, 11.910]
β_1 Positive response	-0.019 (0.001)	-2.05	<0.001	[-0.021, -0.017]
β_2 Validation response	-0.277 (0.001)	-25.11	<0.001	[-0.279, -0.275]
β_3 Interest response	-0.433 (0.001)	-36.47	<0.001	[-0.435, -0.431]
Model 3: Positive affect as a reference group				
Intercept	11.538 (0.188)		<0.001	[11.170, 11.907]
β_1 Validation response	-0.258 (0.001)	-23.32	<0.001	[-0.260, -0.256]
β_2 Interest response	-0.414 (0.001)	-34.76	<0.001	[-0.416, -0.411]
Model 4: Validation as a reference group				
Intercept	11.269 (0.208)		<0.001	[10.920, 11.731]
β_1 Interest response	-0.156 (0.001)	-12.35	<0.001	[-0.158, -0.153]

Note. SE = standard error, CI = confidence interval. Effect size (s) = exponentiated predicted values that indicate lag times until subsequent disclosures in seconds for maternal response variables. All models include adolescent age, gender, disclosure frequency, duration, and durations of maternal emotions as covariates (random effects). Only non-redundant coefficients are shown for each model.

taking and each maternal response were included in a subsequent model with neutral affect as the reference group (see Table 3). To examine interactive effects, adolescents were divided into high and low perspective taking based on the mean of this variable (see Table 1). The effect these interaction coefficients had on the exponent of the predicted outcome can be interpreted as the difference in the effect size for specific maternal ERRs between adolescents with high and low perspective taking.

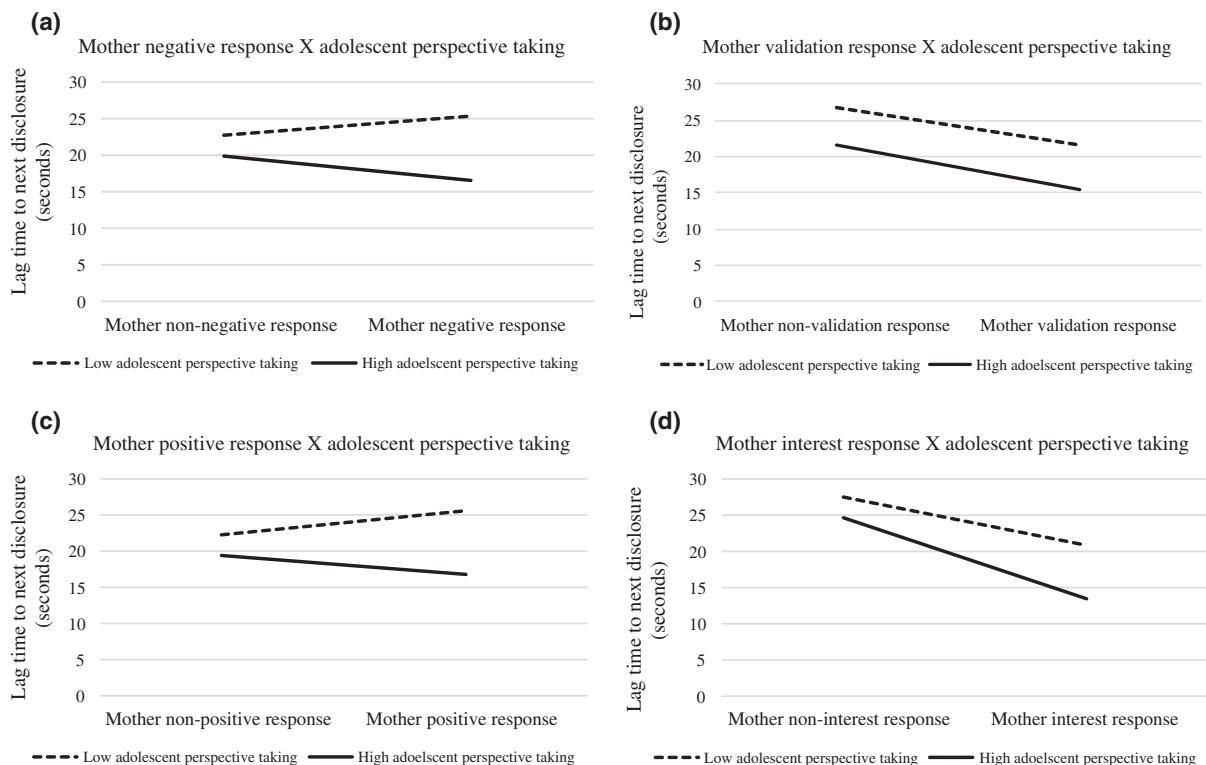
Results indicated that although there was no main effect of adolescent perspective taking on lag time to subsequent disclosures, there were significant interactions between adolescent perspective taking and each maternal

TABLE 3 Interactions between maternal ERRs and adolescent perspective taking predicting lag times to subsequent adolescent disclosures

Variable	Estimate (SE)	Effect size (s)	<i>p</i>	95% CI
Fixed effects				
Intercept	10.208 (0.165)		<0.001	[9.884, 10.531]
β_1 Negative X PT	-0.286 (0.001)	-6.75	<0.001	[-0.289, -0.284]
β_2 Positive X PT	-0.287 (0.002)	-6.77	<0.001	[-0.291, -0.283]
β_3 Validation X PT	-0.119 (0.002)	-3.04	<0.001	[-0.123, -0.116]
β_4 Interest X PT	-0.326 (0.002)	-7.54	<0.001	[-0.330, -0.322]
Random effects				
β_5 PT	0.233 (0.240)	7.12	0.334	[.240, 0.705]

Note. SE = standard error, CI = confidence interval, PT = perspective taking. Effect size (s) = exponentiated predicted values that indicate lag times until subsequent disclosures in seconds. All models include main effects of maternal emotional responses.

ERR. Probing of the interactions revealed that when mothers responded to adolescent disclosures with non-neutral affect, adolescents high in perspective taking were more likely to disclose again more quickly (see Figure 1). This was particularly true for when mothers responded to adolescent disclosures with interest, with adolescents high in perspective taking disclosing on average approximately 8 s more quickly than adolescents low in perspective taking (see Table 3, β_4). Interestingly, the interactive effect of maternal ERRs and adolescent perspective taking was smallest for validation. Specifically, if mothers responded to adolescents' previous disclosures with validation, adolescents subsequently disclosed only about 3 s more quickly if they were high in perspective taking (β_3), compared with approximately 7 s more quickly if mothers responded with positive or negative affect (β_1 and β_2).

**FIGURE 1** Interactions between maternal emotional responses to adolescent disclosures and adolescent perspective taking predicting lag times to subsequent disclosures

4 | DISCUSSION

The present investigation examined contingent temporal associations between adolescent disclosures, mothers' ERRs to these disclosures, and the timing until subsequent disclosures during parent–adolescent conversations. This study is unique in that it tested whether specific maternal ERRs to adolescent disclosures *in the moment* predicted the timing of future disclosures. Consistent with hypotheses, results indicated that when mothers responded to adolescents' disclosures with validation (i.e., understanding) or interest (i.e., curiosity), adolescents were more likely to make subsequent disclosures with a shorter lag time—they were more likely to disclose again more quickly—than if mothers responded with positive, negative, or neutral affect. Interestingly, the lag time until subsequent adolescent disclosures was longest when mothers responded to disclosures with neutral affect, though differences between neutral, positive, and negative affect, though statistically significant, were quite small. Furthermore, the effect of maternal responses on the timing of adolescent disclosures was moderated by adolescent perspective taking. Specifically, adolescents high in perspective taking were more likely to disclose more quickly when their mothers responded to their disclosures with non-neutral affect, particularly when mothers responded with interest. Below we discuss these findings in detail and consider their implications for the promotion of disclosure in adolescence.

4.1 | Maternal responses to adolescent disclosures and the timing of subsequent disclosures

Impressively, when mothers responded to adolescent disclosures with validation, adolescents disclosed again on average about 27 s more quickly than if mothers responded to adolescent disclosures with neutral affect, and they disclosed again 37 s more quickly if mothers responded with interest compared with neutral. These findings remained after controlling for overall levels of maternal behaviors and frequency/duration of adolescent disclosures. Thus, these findings reflect the effect of specific maternal responses to adolescent disclosures *in the moment*, rather than global features of mother–adolescent interactions.

Parental validation of their children's emotions is key in facilitating strong emotion regulation skills in children and adolescents by communicating that their feelings are justified (Gottman et al., 1996). Our findings are consistent with previous research on adolescent disclosure using self-report finding that adolescents are more likely to disclose to parents if they perceive the parent as accepting (Keijsers, Branje, VanderValk, & Meeus, 2010) and expect parents to react supportively (e.g., with validation) to their disclosures (Tilton-Weaver et al., 2010). Indeed, recent observational studies on adolescent disclosure have found that adolescents' perceived parental validation is associated with more substantive disclosures (Gamache Martin et al., 2018) and that older adolescents are more likely to disclose more quickly in the context of high maternal validation (Main et al., 2018).

Parental interest may have been a particularly important predictor of the timing of subsequent adolescent disclosures in the present study because it reflects parental solicitation (Fröjd, Riittakertt, & Rimpelä, 2007), which has also been associated with greater disclosure using self-report (Keijsers et al., 2010; Stattin & Kerr, 2000). The observed pattern of adolescent disclosure followed by maternal interest, in turn followed by adolescent disclosure likely reflects adolescents' elaborations by disclosing more information about the topic. However, previous findings on whether parental solicitation predicts greater adolescent disclosure is somewhat mixed, with some studies finding null or even opposite effects (e.g., Keijsers et al., 2009). These findings may reflect adolescents' perceptions of parental solicitation as intrusive, especially during a time when adolescents are striving for greater autonomy (Fuligni, 1998).

It is important to note that parental questions were coded as interest in the present study only if they were deemed by observers to genuinely reflect curiosity and interest in the adolescent's point of view (see Coan & Gottman, 2007). Questions deemed intrusive were coded as domineering (a negative code), providing us with confidence that observers' coding of parental interest reflected genuine curiosity to learn more about the adolescent's

point of view and feelings. Furthermore, parental interest could be nonverbal (e.g., positive nonverbal attention), which may have facilitated greater disclosure than direct questions. One of the main advantages of this observational method is the ability to capture naturally occurring behaviors during parent-adolescent conversations, which shed greater light on how parents facilitate disclosure in the context of these relationships. Although both validation and interest were found to be important predictors of subsequent disclosure in the present study, functional differences in these behaviors may help explain the larger impact made by communicated mother interest. Specifically, although validation communicates understanding and thus, less of a need for elaboration, interest demonstrates a desire to learn more and therefore may prompt a social partner to disclose further.

Contrary to hypotheses, maternal negative affect was associated with *shorter* lag times to subsequent disclosures compared with neutral responses. It is possible that neutral affect demonstrated a lack of engagement by the parent, discouraging adolescents from engaging in further disclosure. However, this result should be interpreted with caution given that the average difference in lag time between negative and neutral affect was less than one second. It is possible that in the context of conflict, adolescents expected their mothers to express more negative emotion, and thus were less deterred from disclosing when mothers responded negatively than they might be in other conversational contexts. In fact, open expression of negative emotion is often central to resolving conflict (Dailey, 2006), and a recent study showed that older adolescents disclosed more quickly in the context of high maternal negative affect compared with low negative affect (Main et al., 2018). It is also possible that distinct negative emotions had different effects on the timing of subsequent disclosures. For example, adolescents may have had longer lag times to subsequent disclosures when parents responded with criticism versus sadness. Indeed, there are important distinctions in the functions emotions serve in interpersonal interactions within valence (see Walle & Campos, 2012). Though we did not have the power to detect differences between the effects of distinct negative emotions in the current study, this is an important direction for the future research.

Though positive parental responses (e.g., affection, humor) were associated with shorter lag times to subsequent disclosures compared with neutral and negative affect, these differences were small (less than 3 s). The distinctive findings between positive, validation, and interest parental responses are noteworthy given that validation and interest are often collapsed with other positive behaviors. The most frequently occurring parent-positive ERR code in the present study was humor. Although humor is generally a positive feature of parent-adolescent interactions, it may not be as effective in promoting further adolescent disclosure because it may reflect a lack of engagement with or seriousness about the adolescent's perspective. Our findings highlight the importance of examining the unique roles that specific positive behaviors may play in the context of parent-adolescent conversations. These results are consistent with Gottman, Katz, and Hooven's (1996) emotion coaching framework, in which general parental positivity and warmth is considered a separate parenting dimension from parents' attunement to their children's emotions. Indeed, general parenting styles are not as predictive of child outcomes as specific parenting behaviors (Bardack, Herbers, & Obradović, 2017).

4.2 | The role of adolescent perspective taking

Though there was no main effect of adolescent perspective taking on the timing of subsequent disclosures, there were significant interactions between maternal ERRs to adolescent disclosures and adolescent perspective taking. Specifically, adolescents high in perspective taking were more likely to disclose again more quickly when mothers responded to their previous disclosures with non-neutral affect. This was particularly true for maternal interest responses. Although maternal interest was coded as reflecting genuine curiosity, it is possible that adolescents varied in their appreciation of their mother's goal in expressing interest as a function of their perspective taking tendencies.

Perspective taking abilities improve over the course of adolescence (Van der Graaff et al., 2014), in part due to cognitive changes that facilitate improved emotion regulation, executive functioning, and social cognition, and developments in affective processing during this period (De Waal, 2007). Adolescents high in perspective taking may

have appreciated more fully their mothers' goal of wanting to learn more about their point of view and/or feelings when mothers expressed interest; thus, these adolescents were more likely to engage in subsequent disclosures more quickly. In fact, highly empathic adolescents have more accurate perceptions of parents' intentions during conflict interactions (Van Lissa et al., 2017). It is also possible that parent-adolescent dyads in which mothers engaged in high levels of interest and adolescents were high in perspective taking reflected a more global dynamic of good parent-adolescent relationship quality. Indeed, adolescents are more empathically accurate in relationships with good attachment security (Diamond et al., 2012). Though global perceptions of relationship quality are important, the present study's use of dynamic methods to capture transactional associations between responses to children's and adolescent's emotions and behaviors sheds light on how such patterns become characteristic of relationships over time (Granic, 2000).

4.3 | Limitations and future directions

Though novel and informative, this study had limitations deserving further consideration. First, only mothers were included. Fathers generally display fewer supportive and more non-supportive responses to their children (Cassano, Perry-Parrish, & Zeman, 2007), and adolescents report disclosing less to fathers than to mothers (Smetana et al., 2006). A more recent study found that adolescents reported decreased trust and communication with both parents, but particularly mothers, over the course of adolescence (Ebbert, Infurna, & Luthar, 2018). However, this study was based on adolescent report. Very few studies have examined discourse patterns in observational studies with fathers. Thus, future research could incorporate fathers and other caregivers to determine whether the observed patterns are consistent across different relationships.

Second, the study examined the timing of adolescent disclosures, but the content of these disclosures is also important (see Rote & Smetana, 2016). Adolescents with better perspective taking skills might choose *not* to disclose certain information parents to avoid making the parent upset or to avoid punishment, such as activity relating to sexuality or drug use. Indeed, one common reason adolescents provide for choosing not to disclose to parents is fear of getting in trouble (Darling, Cumsille, Caldwell, & Dowdy, 2006). Thus, examining the content of disclosure during real-time parent-adolescent interactions is an important direction for future work.

Third, though the present study makes an important contribution to the literature by assessing adolescent disclosure in a context in which they were not instructed explicitly to disclose, adolescents may have felt less comfortable than they would in everyday life disclosing to parents during videotaped conversations about topics that might elicit negative emotion or disapproval from the parent. An important direction for future work would be to examine spontaneous disclosures to parents in the home environment.

Fourth, though examining specific parental responses to adolescent disclosures using behavioral coding is a unique strength to the present study, adolescent interpretations of parental behaviors were not captured. It would be interesting to examine whether adolescents with more accurate perspective taking regarding specific parental behaviors were more likely to engage in quicker subsequent disclosures. Future research using methods to capture such perceptions (e.g., video recall tasks) are needed to test this hypothesis.

Finally, although the present study examined temporal contingencies between parental responses and future adolescent disclosures, a study that combines micro-level and longer timescales is needed to determine whether these patterns change over adolescence (Cole, Loughheed, & Ram, 2018).

4.4 | Conclusions and implications

Within a naturalistic discussion, adolescents engaged in more frequent disclosure when mothers responded to their previous disclosures with validation and interest compared with positive, negative, and neutral affect. These findings suggest that parental communication of validation and interest are particularly important in promoting adolescent disclosure in the context of parent-adolescent conversations. These behaviors are particularly

important given the limited time and frequency of opportunities that parents may have to solicit such disclosures. The present study holds important implications for interventions with families struggling with lack of disclosure. Specifically, parents should be encouraged to validate and show interest in their adolescent's point of view and feelings to encourage future disclosures. Furthermore, interventions promoting perspective taking skills in adolescence may promote greater adolescent appreciation of parents' communication attempts, which in turn can facilitate stronger parent-adolescent relationships.

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