

# Everyday Emotions: Naturalistic Observation of Specific Positive Emotions in Daily Family Life

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With technological advances rapidly expanding our ability to collect continuous streams of passive recordings, new techniques for processing and analyzing data of this type are needed. This article presents a feasible, reliable, and valid language-based methodology for scanning large quantities of naturalistic recordings to study specific positive emotions in families. Detailing a keyword approach to identifying and coding verbal expressions of compassion, gratitude, pride, and amusement in video transcripts, this study demonstrates one way of locating phenomena, such as emotion, that arise across many different situations in family life. Transcripts of over 350 hr of video recordings obtained from 32 families interacting in their homes and communities were coded to describe the rates per hour at which mothers, fathers, and school-age children verbally expressed 4 positive emotions. Parents expressed compassion, gratitude, and pride more often than children did, but they expressed amusement at similar rates. Gender comparisons revealed that mothers expressed compassion and gratitude more frequently than fathers, and girls expressed these emotions more often than boys. The specific emotion approach allowed us to probe the association between parental and child-expressed positivity: Mothers' expressions of compassion were the most powerful predictor, explaining over half the variance in children's expressions of positive emotion. This study describes a promising approach to analyzing large volumes of passive data; the results show how families differ with respect to the landscape of 4 specific positive emotions and suggest how and why these emotions should be differentiated in studies of daily family life.


*Keywords:* positive emotions, naturalistic observation methodology, parent–child interactions, family

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Naturalistic observational methods, such as recordings of families in their homes, give us the greatest approximation of the phenomena of inherent interest to family scholars—how

family members behave in their daily lives across a wide variety of situations (Repetti, Wang, & Sears, 2013). Rather than capturing how families act in structured laboratory settings for 10 min or asking respondents to recall and make complex subjective judgments about their usual patterns of behavior, this methodology opens a window into the actual social situations family members encounter and their behavior in them. The naturalistic observational study described here illustrates one strategy for assessing spontaneous emotion expression in families when hundreds of hours of data have been collected.

In particular, we focus on positive emotion expression. Parents' positive expressivity has been linked to a host of beneficial child outcomes, including social competence, prosocial behavior, and positive emotionality (Morris, Silk, Steinberg, Myers, & Robinson, 2007). This study supplements the existing literature by examining mothers', fathers', and school-age children's spontaneous verbal expressions of four positive emotions: compassion, gratitude, pride, and amusement. We ask whether spontaneous verbal expressions of these emotions can be reliably identified and differentiated, who expresses them, and at what rates. Finally, we delve into the well-established advantages of a positive emotional climate in the home by testing which specific parent emotions are associated with children's overall positivity.

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### Methods Currently Used to Assess Emotion Expression Frequency in Daily Family Life

Questionnaires and interviews are by far the most commonly used methods to assess how everyday emotion expression differs between families (Fosco & Grych, 2007; Halberstadt, Cassidy, Stifter, Parke, & Fox, 1995; Luebke & Bell, 2014; Wood et al., 2007). Intensive repeated methods, such as diaries and experience sampling, represent alternative, although less widely used, self-report measures of emotion expression in family interaction (Cummings, Goeke-Morey, Papp, & Dukewich, 2002; Merrilees, McCormick, Hsueh, Chou, & Cummings, 2018). These tools are essential to providing insight into internal constructs such as thoughts and feelings, and they excel as accounts of participants' perceptions of their family life. However, self-reports are vulnerable to respondent bias and require participants to make complex judgments about behavior (Alisic, Barrett, Bowles, Conroy, & Mehl, 2016; Repetti et al., 2013).

An alternative to family members' descriptions of their typical or daily emotion expression is to bring direct observation into their natural settings. A common naturalistic design resembles the laboratory paradigm inasmuch as the observations focus on familiar scenes, such as dinnertime or playtime (Boyum & Parke, 1995; Costigan, Cox, & Cauce, 2003). For example, maternal emotional behavior has been coded in recordings of infant bedtime interactions (Teti, 2017) and end-of-workday reunions with preschoolers at a daycare center (Repetti & Wood, 1997). Because of the situational and time constraints imposed by these designs, it is possible to adapt coding methods developed for structured laboratory studies. Naturalistic observations offer greater ecological validity, and they allow investigators to characterize spontaneous emotion expression in a family's everyday life, something that laboratory observations are not designed to do. However, these naturalistic paradigms limit the assessment of emotion expression, which can occur at any point in the day, to a particular circumscribed context.

### Processing Continuous Streams of Naturalistic Family Recordings

Advances in technology over the last decade (e.g., smart homes, wearables, and digital storage) have dramatically changed the way psychologists can collect video and audio data by providing low-cost opportunities to record continuously and passively in naturalistic settings (Nelson & Allen, 2018). Yet, these data-collection advances have far outpaced technologies for automated analyses of recordings and for the extraction of meaningful units of information (de Barbaro, 2019). Psychologists are likely hesitating to dive into these rich data-collection opportunities because we have yet to develop the means to *process and analyze* the enormous volume of information stored in streams of video data. There is an exponential difference between analyses of 10 min versus many hours of observation per family. The challenge for family researchers is to scan vast quantities of recordings to detect the behaviors and events of interest. Although there is hope that at some point in the future, machine learning will allow us to reliably identify instances of emotion or other phenomena of interest, by waiting for that day to arrive, psychology is largely failing to capitalize on the rich naturalistic data that we are now able to collect. We are neglecting

all the questions that can be addressed right now with creative use of the currently available tools.

At present, it is more feasible to scan for language than it is to scan for facial expressions or physical movements. Tools such as Linguistic Inquiry and Word Count (LIWC; Pennebaker, Francis, & Booth, 2007) can count the presence of specific words and may work for broad constructs such as positive versus negative emotion (Kahn, Tobin, Massey, & Anderson, 2007). However, simple word counts are less valid for the study of more nuanced constructs such as compassion. A language-based method that can detect meaningful family behavior in continuous streams of data is needed.

### A New Approach to Detecting Spontaneous Emotional Expression

The current study presents a new language-based method that bridges traditional observational coding methods in child development and family studies, with the goal of scanning and analyzing hundreds of hours of recordings. Transcripts are filtered for keywords that flag possible instances of an emotion expression (e.g., "better"). Whether or not an emotion occurred is then determined by examining the conversation surrounding each keyword. For example, a mother saying she hopes her son feels "better" when he has a cold would be coded as the mother's expression of compassion. A mother commenting on how her daughter did "better" on a particular test would be coded as an expression of pride. In contrast, a mother stating that she likes blue "better" than red would not be coded as emotional. The transcripts were drawn from a larger archive collected by the University of California, Los Angeles (UCLA) Center on Everyday Lives of Families (CELFL); 32 families with a school-age child were video recorded in their homes, cars, and communities, giving us a rare view into their everyday family interactions (for more information, see Ochs & Kremer-Sadlik, 2013).

Our approach also brings the emotion science conceptualization of specific emotions to the study of family interaction. Research on families' expressions of positive emotions has primarily assessed positive expressivity, with emotions such as happiness, affection, pride, gratitude, love, and compassion amalgamated rather than differentiated (Fitness, 2013; Repetti & McNeil, 2018). Meanwhile, the emotion literature suggests that when studied in individuals, positive emotions like pride and gratitude have distinct functions and roles in social dynamics (Smith, Tong, & Ellsworth, 2014). This study asks whether verbal expressions of four specific emotions—compassion, gratitude, pride, and amusement—can be reliably identified and differentiated by our keyword search and coding approach, as well as how frequently and by whom these emotions are expressed.

### Emotion Socialization

Studying these four specific positive emotions in the family context is critical because parents' emotional behavior shapes how children express and regulate emotion (Eisenberg, Cumberland, & Spinrad, 1998). Parental positive expressivity is associated with children's expressions of positive emotions as well as their increased social competence and adjustment (Eisenberg et al., 2003). But children's emotional learning is not limited to parent-child interactions; observations of parents' emotional expression and the

family emotional climate also influence children's emotional expressivity (Morris et al., 2007).

A specific-emotions approach may offer family and emotion-socialization researchers some new leverage. For example, in their meta-analysis, Halberstadt and Eaton (2003) point to heterogeneity in the association between family positive expressivity and child positive expressivity that is not explained by age or measurement diversity in the studies. Perhaps the heterogeneity can be attributed to the inclusion of different varieties of positive emotions, all with their own function, that are combined in measures of parent positive emotion expression. Differentiating among different emotions may offer new insight into how parental positivity is associated with child positivity.

### Specific Positive Emotions

We selected four positive emotions that we expected to be particularly relevant in family interaction and that could be detected with a language-based method. Compassion, gratitude, and pride are all positive emotions that are represented with multiple items in the Self-Expressiveness in the Family Questionnaire (SEFQ; Halberstadt et al., 1995), the most commonly used participant-report measure of family emotional expressivity, and that can be expressed easily in words—for example, “I’m sorry,” “thanks,” and “I won!” We selected amusement as a proxy for happiness or joy because it seemed more likely to be detected verbally (e.g., “that’s funny”).

With amusement representing happiness, these four emotions conceptually fall across the plane of Haidt's (2003) moral emotion framework, which examines emotions on two dimensions: high to low prosocial action tendencies and self-interested to disinterested elicitors. Compassion, gratitude, and pride are all emotions that promote prosocial action tendencies, behaviors families likely want to foster. With their orientation toward others, these emotions are likely to arise in interpersonal contexts such as the family.

### Compassion

We define compassion as *the sympathetic consciousness of another's distress, together with a desire to alleviate it or have it be alleviated* (Haidt, 2003). Compassion, which is often used synonymously with sympathy and is closely related to empathy, is thought to have evolved for the protection of the young and weak and to encourage group cooperation (Goetz, Keltner, & Simon-Thomas, 2010). Although it is an inherently interpersonal emotion and likely abundant in family relationships, it has been surprisingly neglected by family and developmental psychologists (Kirby, 2016). The research that does exist examines how parental affectivity fosters sympathy and empathy in children (Michalik et al., 2007). Although we have not found any prior research on the effects of parental compassion on children's positive emotion expression, we expect the association exists because maternal sensitivity has been linked with more positive affect in children (Davis & Suveg, 2014). Perhaps a sensitive mother's expressions of compassion facilitate her children's recovery from negative events, for example. Of the four emotions, compassion is the least likely to be elicited by self-interest and has the strongest prosocial action tendencies (Haidt, 2003).

### Gratitude

*Gratitude*, which we define as *a feeling of appreciation for another's actions or words*, encourages us to recognize and stay close to those who have already offered us support and will likely continue to do so (Algoe, Haidt, & Gable, 2008). Despite a rapidly growing literature on adult gratitude, little research has been conducted on gratitude in children (Lambert & Veldorale-Brogan, 2013). Gratitude interventions suggest that children's feelings of gratitude lead to increased subjective well-being, increased prosocial behavior, and greater social integration (e.g., Froh, Bono, & Emmons, 2010). A study of dispositional gratitude found that children's self-reported gratitude was correlated with their mothers' but not their fathers' gratitude scores (Hoy, Suldo, & Mendez, 2013). Although expressing gratitude appears to have beneficial outcomes for children, it has yet to be studied in children's everyday lives. Gratitude and compassion share high prosocial tendencies, but gratitude is more likely to be elicited by self-interest (Haidt, 2003).

### Pride

When studied in families, pride can take at least two forms. The first is the self-promoting kind of pride that has been captured in studies of emotion in individuals (e.g., Tracy & Robins, 2004). We define this as *a feeling that one respects him- or herself and deserves to be respected by other people due to an action or characteristic*. The second form—a *feeling of happiness because of another person doing and/or being something good, difficult, etc.*—is common in close relationships where one takes pride in a partner's accomplishment, such as a parent feeling proud of a child's hard work. This form has been largely overlooked in the emotion literature because it is an emotion rooted in close relationships, but it is included in measures of family emotion such as the SEFQ (Halberstadt et al., 1995). Pride, especially the first form, is more likely to be elicited by self-interest compared with gratitude or compassion but has weaker prosocial action tendencies (Haidt, 2003).

### Amusement

We define *amusement* as *being entertained or finding something funny, possibly through physical or mental play, which likely occurs in moments of family levity*. The emotion literature indicates that expressions of amusement evolved because they help in establishing an ingroup, excluding the outgroup, and maintaining group cohesion (Shiota, Campos, Keltner, & Hertenstein, 2004). Amusement can also be a source of coping for children, and children recognize how feeling amused can make them feel better (Dowling, 2014). Happiness, for which we have used amusement as a verbal proxy, falls on the opposite sides of Haidt's (2003) two dimensions when compared with compassion; it has self-interested elicitors and weak prosocial tendencies.

### Gender Differences

Although no studies to our knowledge have examined spontaneous verbal expressions of specific positive emotions, there is evidence of gender differences for parents and for children in expressions of positive emotion blends, some from self-reports and

some from direct observation. Findings about verbal and nonverbal expressions are difficult to untangle because most studies merge the two in their questions or coding. Research indicates that women express more emotion than men, both verbally and non-verbally (Brody & Hall, 2010), and indirect evidence suggests that mothers and fathers may express specific emotions, such as compassion and amusement, at different rates. Parent–child studies reveal some differences between mother–child and father–child relationships that have been interpreted as mothers performing a more caring, nurturing role and fathers a more playful role (Russell & Russell, 1987; Denham, Bassett, & Wyatt, 2010). These interpretations might indicate that mothers offer more compassion and fathers more amusement. However, compared with mothers, we know much less about fathers' emotion expressions and their impact on children (Bariola, Gullone, & Hughes, 2011). The gender-difference findings in adults are paralleled in studies of children. In a meta-analytic review of 166 studies, Chaplin and Aldao (2013) found that girls expressed more positive emotion, including happiness, surprise, and sympathy, than did boys. The review, however, primarily focused on nonverbal emotional expressions.

### Study Aims

By scanning transcripts of hundreds of hours of naturalistic recordings to detect instances of four specific positive emotions, this study addressed three primary aims focusing on measurement, description, and associations between parental emotion and children's positive emotions.

Our first aim was to test whether our keyword search and coding approach is a feasible, reliable, and valid method for identifying a range of verbal expressions of positive emotions in continuous naturalistic recordings of families.

Our second aim was descriptive, to begin to depict the landscape of four positive emotions in family life with observational methodology. We ask: How frequently do parents and children express compassion, gratitude, pride, and amusement, and how do the rates at which those four distinct emotions are expressed compare with one another? This aim was also addressed by asking how family members—children, mothers, and fathers—compare in their expressions of specific positive emotions. Based on studies that suggest mothers assume more of the nurturing and caregiving functions and fathers the more playful role, we expected mothers to express more compassion than fathers, and we expected fathers to express more amusement than mothers. We also compared boys' and girls' expressions of positive emotions, hypothesizing that girls would express all positive emotions more frequently than boys, given Chaplin and Aldao's (2013) review.

Our third aim focused on between-family differences in emotion expression, examining whether a specific-emotions approach could shed new light on the well-established association between a positive emotional climate in the family and children's expressed positivity. We tested each parental emotion—compassion, gratitude, pride, and amusement—as a predictor of children's positive emotion expressions. Given the lack of prior research on specific positive emotions in families, we did not formulate a hypothesis about the relative predictive power of the four emotions. As part of this aim, our design offers a rare opportunity to compare the frequency of maternal and paternal spontaneous positive emotion

expressions. However, because most existing research focuses on maternal emotion expression, we do not venture a hypothesis about the potency of mothers' versus fathers' expressions as predictors of their children's overall expressions of positive emotion.

## Method

### Participants

Thirty-two middle-class families from the Los Angeles area were recruited to participate in a larger study conducted by CELF and consented to partake per American Psychological Association (APA) ethical standards and UCLA's Institutional Review Board. All participating families had two cohabiting adults who each worked full time; at least one child, the target child, between 7 and 12 years old; and their home was owned with a mortgage. Parents' self-identified ethnicities consisted of White non-Hispanic (72%), African American (8%), Asian (8%), Hispanic (6%), and Southeast Asian (6%). The median annual household income was \$115,000 (range of \$58,500–\$515,000 in 2002–2005 dollars).

Because there was one mother and one father in 30 of the CELF families and two fathers in two of the families, the 64 parents in the full sample consisted of 34 fathers and 30 mothers. One father from each of the two-father families was randomly selected for inclusion in analyses of individual fathers and father–child dyads. In two other families, the father was not captured in our recordings on the day that the family's transcripts were analyzed. Therefore, our sample consisted of 32 target children (14 boys, 18 girls; mean age [ $M_{\text{age}}$ ] = 9.40, standard deviation [ $SD$ ] = 1.14), 30 mothers ( $M_{\text{age}}$  = 40.20,  $SD$  = 5.46), and 30 fathers ( $M_{\text{age}}$  = 41.87,  $SD$  = 5.76). Within-family analyses comparing mothers and fathers are based on a sample of 28 families because they do not include the two-father families or the two families in which the fathers were not recorded that day.

### Procedure

**Family recordings and transcripts.** The larger CELF study aimed to capture a “week in the life” of a family with a multimethod approach that included cortisol sampling, daily reports, questionnaires, semistructured interviews, and video recordings, the focus of this study (for details, see Ochs & Kremer-Sadlik, 2013). Two videographers were assigned to each family, and each one was directed to follow one of the parents in the household. Filming on weekdays included families' morning routines before school and their activities from afternoon to nighttime, starting when the first parent came home or picked the children up from school and ending at bedtime. Filming on weekends captured families from wake-up time until bedtime at home. Families were recorded at home and in community settings, such as choir practice and soccer practice. All video recordings were transcribed by research assistants trained by linguistic anthropologists. The transcripts from the first day of filming, a day on which the families were acclimating to the videographers, was used for piloting the coding systems. The transcripts from the first weekday after the first day of filming were used for 31 families. Due to a technical error with the data for one family, the first weekend day after the first day of filming was coded.

**Time on screen.** For the 1-day recordings that were the focus of our analysis, there were 352.72 hr of video. The average time families were captured on screen, by both cameras, was 11.02 hr ( $SD = 3.15$ , range = 5.02–17.10). After duplicates—two cameras filming the same interaction—were removed, the average time families were on screen was 8.14 hr ( $SD = 2.47$ , range = 3.87–14.35). With duplicates removed, mothers were on screen for an average of 4.23 hr ( $SD = 1.50$ , range = 0.60–7.83), fathers for an average of 3.08 hr ( $SD = 1.32$ , range = 0.80–5.73), and target children for an average of 3.63 hr ( $SD = 1.32$ , range = 1.72–6.30).

**Positive emotion coding.** Transcripts were coded in a two-step process.

**Filtering transcripts for possible emotion expressions by keywords.** The first step was to filter the transcripts for possible expressions of compassion, gratitude, pride, and amusement by searching for keywords that might flag these instances. The authors and a team of eight research assistants generated a list of keywords that could relate to one or more emotions of interest. Examples are “sorry” and “feel better” for compassion, “thanks” and “appreciate” for gratitude, “congratulations” and “well done” for pride, “funny” and “hilarious” for amusement, and “good” for any of the four emotions (see the [online supplemental materials](#) for the full list). A review of emotion research was conducted to examine emotional descriptions, experimental prompts related to each emotion, and synonyms for emotions often used interchangeably. Additional keywords were generated when the initial list was pilot tested using transcripts from the first day of filming. Keywords were organized into a list of 97 search terms (e.g., *excit*) and the keyword phrases the term could be found in (e.g., *excite*, *exciting*, *excited*). The emotion or emotions they were most likely to convey were also noted. Rotating pairs of coders systematically located and recorded all instances of keywords and speaker (percent agreement: 90%) in a family’s transcript. Subsequent to computing interrater agreement, the two coders met again to resolve any discrepancies. The coders identified 16,296 instances of keywords.

**Identifying specific positive emotion expressions in context.** For the second step, the same two coders evaluated each keyword in the context of the surrounding transcript to determine if it occurred during an expression of one of the four positive emotions and if so, which emotion was expressed. For example, the word *good* could easily flag any number of emotions or not be emotional at all, depending on the context. This includes compassion (e.g., a parent checking in after a child falls, “Are you good?”), gratitude (e.g., a husband commenting, “That was good of you, thanks”), pride (e.g., a mother stating, “Good job!” when a child gets a homework problem right), and amusement (e.g., a child saying, “This is a good game”). Or *good* might not be marked as not an emotional expression (e.g., a child sharing, “The pizza at school was good today”). Unlike in word-count methodologies such as LIWC (Pennebaker et al., 2007), a keyword did not represent an emotional expression but, rather, flagged a location in the transcript in which an expression of emotion might occur. Definitions of emotional contexts specific to compassion, gratitude, pride, and amusement were developed through an iterative process that began with scientific descriptions and dictionary definitions of each emotion and continued through weekly meetings at which the criteria to define a context as emotional were discussed, emotion definitions were bolstered, and examples were added. Our defini-

tions of each emotion are provided in the introduction. Examples from the transcripts included showing concern for a pet that might be hurt (compassion), thanking a spouse for cleaning up (gratitude), complimenting a child on a school project (pride), and telling a joke (amusement; see additional examples in the [online supplemental materials](#)).

After interrater agreement was assessed, the two coders met again to resolve all disagreements. Thus, the data used in the analyses presented here consist of mother, father, and target-child expressions of compassion, gratitude, pride, and amusement that were agreed upon by two coders. Of the 16,296 instances of keywords in the transcripts, the coders identified a total of 3,772 expressions of positive emotions.

**Rate variables.** We used the number of minutes that each individual was recorded during the day of filming to compute the rates per hour at which each family member expressed each positive emotion across all recordings that day. In addition, we computed a total positive emotion expression (TPEE) rate variable, which represents the rate at which an individual expressed positive emotions that day, summing across compassion, gratitude, pride, and amusement.

## Results

Our measurement goal was addressed by interrater-reliability analyses showing that discrete positive emotions could be discriminated from each other and coded reliably in naturalistic transcript data. To address our descriptive goal, we examined and compared the proclivity of family members to express each of the four specific positive emotions: compassion, gratitude, pride, and amusement. Analyses addressed our unique emotional associations goal by examining which parent (mothers or fathers) and which emotions were the strongest predictors of children’s total expressions of positive emotions.

### Interrater Reliability and Discriminant Validity

To address our first goal of determining whether verbal expressions of specific positive emotions could be reliably coded in transcripts of naturalistic video recordings, we calculated percent agreement and Cohen’s kappa, which in this study pertain to both interrater-reliability and the ability to discriminate among emotions. We found that whether or not a spoken keyword was an expression of one of the four positive emotions (based on the surrounding transcript) could be reliably coded (percent agreement = 85%,  $\kappa = .64$ ). Additionally, coders were able to reliably differentiate among the four specific positive emotions—compassion (percent agreement = 98.21%,  $\kappa = .95$ ), gratitude (percent agreement = 97.22%,  $\kappa = .94$ ), pride (percent agreement = 96.32%,  $\kappa = .90$ ), and amusement (percent agreement = 97.22%,  $\kappa = .88$ ). Because the coding system required coders to assign a specific emotion to the expression, the high Kappa values indicate that the coding system was able to reliably discriminate between the different emotions.

### Descriptions and Comparisons

In addressing our descriptive goal, we first present the rates per hour at which individual family members uttered verbal expres-

sions of specific positive emotions across all interactions. Taken together, the collection of mothers', fathers', and children's rates paint a picture of the family's overall emotional environment. Second, we compared these rates in two ways; one set of analyses compared the rates at which different specific emotions (e.g., amusement vs. compassion) were expressed by each family member, and a second set of analyses contrasted the rates at which different family members expressed positive emotions—comparing mothers', fathers', and children's propensities. Third, we examined gender differences in children by comparing the total expressions of boys and girls.

**Family and individual descriptive statistics and emotion rates.** With all four positive emotions reliably coded, we were able to ask how often each positive emotion was expressed in families (see Figure 1). Figure 1 presents the mean rates per hour of time on screen that mothers, fathers, and target children expressed compassion, gratitude, pride and amusement. The error bars in Figure 1 indicate the standard deviations. Figure 1 also allows for visual comparisons of rates of specific emotions as expressed by each family member and for visual comparisons of mothers', fathers', and children's rates of expressing each emotion.

When we combined the verbal expressions of both parents (whether same sex or opposite sex) and the target child within each family, we found great variability among the households. The range in our sample of families represents a sixfold difference: from 5 to more than 30 verbal expressions of positive emotions per hour ( $M = 16.18$ ,  $SD = 7.25$ , range: 5.18–32.96).

**Comparing specific positive emotions.** Repeated-measures analysis of variance (ANOVA) and post hoc paired-sample  $t$  tests revealed that mothers tended to verbally express amusement less often than compassion,  $t(29) = -3.36$ ,  $p = .002$ , 95% confidence interval (CI)  $[-2.86, -.70]$ ,  $d = -.63$ ; gratitude,  $t(29) = -5.69$ ,  $p < .001$ , 95% CI  $[-3.16, -1.49]$ ,  $d = -1.08$ ; and pride,  $t(29) = -3.63$ ,  $p = .001$ , 95% CI  $[-3.14, -.88]$ ,  $d = -.72$ ;  $F(3, 87) = 8.81$ ,  $p < .001$ ,  $\eta_p^2 = .23$ . They expressed compassion, gratitude, and pride at similar rates,  $F(1.65, 47.86) = .61$ ,  $p = .517$  not statistically significant ( $ns$ ),  $\eta_p^2 = .02$  (when violation of sphericity occurred, we applied the Greenhouse–Geisser correction). Fathers expressed all four emotions at similar rates,  $F(3,$

87) = 2.72,  $p = .049$ ,  $\eta_p^2 = .09$  (post hoc tests =  $ns$  after Bonferroni correction). Among children, amusement was expressed more often than pride,  $F(3, 93) = 5.91$ ,  $p = .006$ ,  $\eta_p^2 = .16$ ;  $t(31) = 4.60$ ,  $p < .001$ , 95% CI  $[.01, .03]$ ,  $d = .90$ , but gratitude, compassion, and amusement were expressed at similar rates,  $F(1.40, 43.45) = 3.34$ ,  $p = .061$   $ns$ ,  $\eta_p^2 = .10$ ). With two exceptions involving expressions of amusement—rates were relatively low among mothers and relatively high among children—the emotions were expressed at similar rates by each family member (see Figure 1).

**Gender difference in parents' rates of expressions.** As expected, mothers expressed more positive emotions overall than fathers did (see Table 1). We then compared mothers' rates of expressing each of the emotions to fathers' rates of expression. As hypothesized, mothers expressed more compassion than fathers did (see Table 1). Mothers also expressed more gratitude than fathers. However, mothers and fathers expressed amusement and pride at similar rates. Our hypothesis that fathers would express more amusement than mothers was not supported.

We also compared children and parents with respect to expressions across the day. Paired-sample  $t$  tests revealed that mothers and fathers expressed more compassion, gratitude, and pride than their children did. Parents and children expressed amusement at similar rates (see Table 1).

**Gender differences in children's rates of expressions.** To address our hypothesis that girls express positive emotions more often than boys, we conducted independent  $t$  tests between female ( $n = 18$ ) and male ( $n = 14$ ) target children. We found no significant difference when girls' and boys' rates of TPEE were compared. Comparisons of specific emotion rates revealed that girls expressed both more compassion, girls:  $M = 1.70$ ,  $SD = 1.59$ , boys:  $M = .44$ ,  $SD = .61$ ;  $t(22.93) = -3.09$ ,  $p = .005$ , 95% CI  $[-2.10, -.42]$ ,  $d = -1.15$ , and more gratitude, girls:  $M = 1.85$ ,  $SD = 1.09$ , boys:  $M = .89$ ,  $SD = .68$ ;  $t(28.89) = -3.06$ ,  $p = .005$ , 95% CI  $[-1.60, -.32]$ ,  $d = -1.09$ , than did boys. Boys and girls did not differ in their rates of amusement or pride. This pattern parallels the gender differences seen in parents' rates of expressions: Mothers and girls expressed more compassion and gratitude than fathers and boys did; the two genders did not differ in their rates of expressing amusement and pride.

## How Parents' Specific Emotions Relate to Children's Positive Emotion Expressions

To examine how parents' emotion expressions might be linked with children's positive emotions, we used a child's TPEE score, his or her rate of total positive emotion expression collapsing over all positive emotions, as the outcome variable. First we examined Pearson correlations between child TPEE and parent expressions of compassion, gratitude, pride, and amusement. Children's TPEE was significantly correlated with one of the four maternal variables, mothers' expressions of compassion,  $r(28) = .68$ ,  $p < .001$ ; it was marginally correlated with mothers' expressions of gratitude,  $r(28) = .36$ ,  $p = .051$ . Two paternal variables were significant correlates of children's TPEE: fathers' expressions of compassion,  $r(28) = .48$ ,  $p = .008$ , and of gratitude,  $r(28) = .46$ ,  $p = .011$ . Neither mothers' nor fathers' expressions of amusement and pride emerged as significant correlates of children's overall positive emotion.

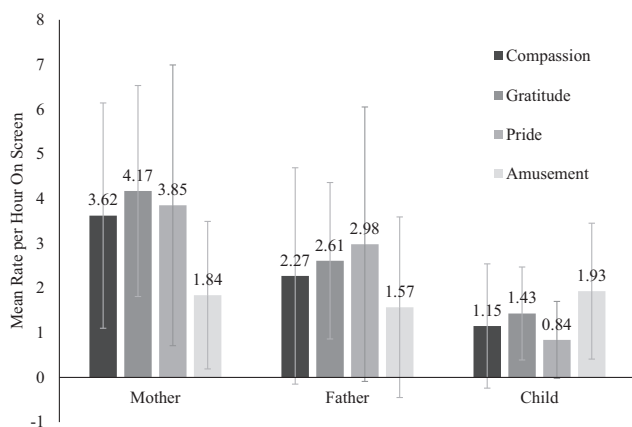


Figure 1. Mean rate of expressing compassion, gratitude, pride, and amusement per hour of time on screen for mothers, fathers, and target children. Error bars indicate standard deviations.

Table 1  
Paired-Sample *t* Tests Comparing Parents to Children on Rates of Compassion, Gratitude, Pride and Amusement Expressions

Dyad	Mean difference (SD)	<i>t</i> value	95% CI	Cohen's <i>d</i>
<b>TPEE</b>				
Mother–father	4.41 (8.33)	2.80**	[1.17, 7.64]	.53
Mother–child	8.43 (6.55)	7.056***	[5.99, 10.88]	1.54
Father–child	4.06 (6.32)	3.517**	[1.70, 6.42]	.71
<b>Compassion</b>				
Mother–father	1.48 (2.88)	2.72*	[.36, 2.59]	.52
Mother–child	2.61 (2.03)	7.049***	[1.85, 3.37]	1.52
Father–child	1.13 (2.72)	2.286*	[.12, 2.15]	.43
<b>Gratitude</b>				
Mother–father	1.77 (2.51)	3.73**	[.80, 2.75]	.70
Mother–child	2.79 (2.26)	6.768***	[1.95, 3.64]	1.43
Father–child	1.17 (1.64)	3.928***	[.56, 1.78]	.77
<b>Pride</b>				
Mother–father	.90 (3.62)	1.32	[–.50, 2.31]	.25
Mother–child	3.01 (3.39)	4.861***	[1.74, 4.28]	.98
Father–child	2.17 (3.36)	3.528**	[.91, 3.42]	.71
<b>Amusement</b>				
Mother–father	.24 (2.70)	.46	[–.81, 1.28]	.09
Mother–child	–.00 (1.68)	–.001	[–.63, .63]	.00
Father–child	–.41 (2.32)	–.975	[–1.28, .45]	–.18

Note. TPEE = total positive emotion expressions and is based on all expressions of compassion, gratitude, pride, and amusement. For mother–father *t* tests, degrees of freedom (*df*) = 27. For parent–child *t* tests, *df* = 29.

\*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ .

In a linear regression with all four maternal predictor variables, expressions of compassion predicted children's expressions of positive emotion after controlling for mothers' expressions of gratitude, pride, and amusement (see Model 1 in Table 2). Similarly, in the analogous regression model with four paternal predictor variables, fathers' expressions of compassion predicted children's TPEE after controlling for fathers' expressions of gratitude, pride, and amusement (see Model 2 in Table 2). To test whether mothers' or fathers' expressions of positive emotions might be stronger predictors of children's expressions of positive emotions, we tested a linear regression that included the four correlates of children's TPEE: mother's compassion, mother's gratitude, father's compassion, and father's gratitude. As shown in Table 2 (Model 3), mothers' compassion was the only significant predictor of children's TPEE. To follow up, we examined the correlations between mothers' rates of expressing specific positive emotions and children's rates of expressing each of the four emotions. Mothers' compassion was significantly correlated with children's expressions of compassion,  $r(30) = .60$ ,  $p < .001$ ; gratitude,  $r(30) = .43$ ,  $p = .019$ ; and pride,  $r(30) = .47$ ,  $p = .009$ , and mothers' amusement was correlated with children's amusement,  $r(30) = .43$ ,  $p = .018$ . We tested the age and gender of the child as covariates in all three regressions. Because neither age nor gender was a significant covariate, they were dropped from the final models.

## Discussion

This study proposes a novel approach to processing hundreds of hours of continuous recordings in order to investigate spontaneous

verbal expressions of specific positive emotions. We applied a two-stage keyword search and coding technique to detect expressions of compassion, gratitude, pride, and amusement in transcripts of video recordings that captured families' daily routines and unscripted interactions on one day. The data provide proof of concept for a new approach to identifying emotions in continuous family recordings, with evidence also pointing to the method's reliability and validity. We found that all four emotions were expressed regularly; for instance, compassion and pride were not reserved for rare instances of pain or accomplishment but were uttered two to three times an hour by parents and once an hour by children. Mothers expressed compassion and gratitude more often than fathers, and mothers' compassionate words were the strongest predictor of children's positivity, explaining almost half of the variance in children's expressions of positive emotion.

## New Methodology

The application of a comprehensive coding system to this naturalistic archive allowed us to reliably capture verbal expressions of specific positive emotions in daily family interactions. With our keyword and coding approach, we scanned transcripts of over 350 hr of video in order to detect the spontaneous occurrences of emotion across all situations and with all partners. This technique opens the door to the use of naturalistic recordings to address the kinds of questions about family differences that, to date, have been addressed by self-report measures of emotional climate. Although family-member perceptions are essential to our models, the field will undoubtedly benefit by bringing more direct observation to the study of spontaneous family interaction. Continuous recordings capture the broad scope of behavior that we assume respondents are attempting to recall and summarize when asked to describe their interactions (e.g., "How often do you praise your child?"; "Did you comfort your spouse tonight?"). In this respect, contin-

Table 2  
Parents' Specific Positive Emotions Predicting Children's Overall Expressions of Positive Emotions (TPEE)

Predictors	$R^2$	<i>F</i> value	Standardized coefficients beta	95% CI
<b>Model 1: Mother</b>				
Compassion	.494	6.093**	.735***	[.46, 1.36]
Gratitude			–.041	[–.66, .55]
Pride			–.141	[–.52, .24]
Amusement			.183	[–.28, .97]
<b>Model 2: Father</b>				
Compassion	.377	3.778*	.469*	[.10, 1.12]
Gratitude			.328	[–.05, 1.24]
Pride			–.154	[–.52, .21]
Amusement			–.202	[–.89, .26]
<b>Model 3: Mother and father</b>				
Mother compassion	.566	7.511**	.612***	[.31, 1.13]
Mother gratitude			–.083	[–.55, .35]
Father compassion			.213	[–.14, .66]
Father gratitude			.196	[–.21, .90]

Note. TPEE = total positive emotion expressions and is based on all expressions of compassion, gratitude, pride, and amusement. Model 1 and 2: degrees of freedom (*df*) = 4, 25; Model 3: *df* = 4, 23.

\*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ .

uous passive recordings offer a more valid and generalizable view of overall family life compared with laboratory-style naturalistic studies that limit observation to circumscribed situations, such as “family dinners,” “playtime,” or “bedtime.” Of course, each design and measurement approach, whether based on self-report or observation, contributes to our overall understanding of families; we argue that the time has come to bring continuous naturalistic recordings to the table.

Our methodology draws on a word-search tool that is readily available on all computers and on a coding-team technique that is familiar to developmental and family researchers. Although machine learning is likely the wave of the future for analyzing continuous streams of data, the technology is not currently available to analyze phenomena as complex as emotional expression (de Barbaro, 2019). Verbal expressions of positive and negative emotions are already being examined with word counts (e.g., Robbins, Mehl, Smith, & Weihs, 2013). Our methodology improves on that approach because a word is not assumed to represent an emotion but, rather, serves as a flag to a possible instance of emotion. Of the 16,296 instances of keywords found in the transcripts, fewer than 25% (only 3,772) were coded as expressions of compassion, gratitude, pride, or amusement, which suggests the amount of error our measure would contain if all keywords had been counted. The human judgment of coders who consider the broader conversational context in which a word is spoken enhances the meaningfulness and validity of a language-based approach for the study of spontaneous emotion expression.

### Specific-Emotion Approach

With its specific focus on positive emotions, this study also contributes to the literature by bridging the study of families with emotion science. In comparisons of the four specific emotions, compassion and pride were verbally expressed as frequently as gratitude by mothers and fathers, and children expressed compassion at the same rate as amusement and gratitude. Rather than being elicited only by rare negative events like a child being bullied at school, compassion was expressed regularly. Parents' expressions of pride did not occur solely due to a rare homerun hit or an A on a test but instead were offered in response to a correct math problem or to a child brushing her teeth. These patterns suggest that there could be much to learn from the study of specific emotions at the quotidian level. Although this study focused on positive emotions that seemed likely to be verbally expressed in families, the methodology can be extended to investigate other specific emotions, such as awe, disgust, or interest, which have yet to find roots in family research.

### Comparing Mothers and Fathers, Girls and Boys

We believe this study represents the first published comparison of mothers' and fathers' everyday expressions of specific emotions over an extensive period of time and across a wide variety of family situations. Overall, mothers expressed gratitude and compassion more frequently than fathers did, but parents did not differ in their rates of expressing amusement or pride. In parallel, girls expressed gratitude and compassion more often than boys, but they expressed amusement and pride at similar rates. These gender differences support a specific-emotions approach because they

suggest that the greater emotional expressivity of females (Brody & Hall, 2010) might be limited to the more interpersonal emotions, such as compassion and gratitude, rather than applicable to all positive emotions.

### Parental Compassion and Children's Positive Emotions

Parents' expressions of compassion were the strongest predictors of children's positive emotion after controlling for parental gratitude, pride, and amusement. Not only do these findings further emphasize the value of differentiating among emotions, but they also shed new light on the well-documented association between family positivity and child positivity. The heterogeneity that Halberstadt and Eaton (2003) comment on in their meta-analysis may be due to the conceptualization of positive emotion as a single cohesive construct rather than taking into account the unique functions of specific emotions. Our finding suggests that scholars should focus attention on the role of compassion in family dynamics. Because we expect parents to express compassion when their children are sad or frustrated, it is reasonable to predict fewer conversations that elicit compassion in households where children are often expressing positive emotion. Instead, our data showed the opposite pattern: Expressions of compassion, particularly by mothers, were associated with more positive emotion expression by children. Our finding is consistent with the documented association between general family positive expressivity and children's adaptive emotion regulation (Are & Shaffer, 2016; Fosco & Grych, 2013; Halberstadt & Eaton, 2003). Mothers' everyday expressions of compassion may be markers of maternal sensitivity, a behavior linked to more secure attachment in children (Bernier, Matte-Gagné, Bélanger, & Whipple, 2014). Perhaps growing up in a home with compassionate caregivers fosters a sense of trust, security, and well-being in children that facilitates positive emotion expression and recovery from negative events. It is also possible that children's positivity encourages compassion from mothers. Perhaps children who express compassion, gratitude, pride, and amusement often are generally better at expressing detectable emotion, and perhaps their mothers offer compassion more often because their children's emotion expressions are better at signaling opportunities to offer compassion.

The significance of mothers' compassion compared with fathers' may be even stronger than our analyses suggest because the children in CELF families spent significantly more time with their mothers. In another analysis of the larger archive, the most frequently observed person-space configuration was a father alone in a home space; the second most frequent was a mother sharing a space with children, without the father present (Campos, Graesch, Repetti, Bradbury, & Ochs, 2009). Therefore, time with children may magnify the effect of mothers' compassion expressions beyond the patterns described previously, which are based on rates at which the parents expressed compassion per hour on screen. A mother's simple words of compassion may not only have a greater impact than a father's, but children may also hear more of them, both because mothers are more inclined to speak those words and because the amount of time they spend with children provides more opportunities to show their compassion. This finding also has support in the family-climate literature; Fosco and Grych (2013) found that a positive family climate and maternal warmth and



sensitivity were unique predictors of children's emotion regulation, but fathers' warmth and sensitivity was no longer a significant correlate when the other variables were included in the model.

### Limitations and Future Directions

Despite the strengths afforded by naturalistic observational methods, the intensiveness of the data-collection procedures at the time precluded a large sample size. Although we were able to capture many instances of positive emotion expression, they were drawn from only 32 families. This sample size limited our ability to examine the effects of individual-level variables such as child age. Additionally, the CELF archive includes middle-income families living in the Los Angeles area with two working parents and two to three children. These sample characteristics may limit the generalizability of our findings, and the novel patterns reported here require replication. Furthermore, given the sheer quantity of recordings collected, it was too burdensome to ask families to watch and reflect on their recordings. It would be interesting, though, to assess the convergence between our coding scheme and the family members' descriptions of their own expressions. Although we found evidence of discriminant validity, this coding scheme would benefit from tests of additional forms of validity, such as concurrent, convergent, and predictive.

Verbal expression is a fundamental form of emotion communication; in fact, for some emotions, it is the only form of communication thus far identified (e.g., a facial expression for gratitude cannot be distinguished in laboratory studies). However, most emotions are also conveyed through the face, voice, posture, gesture, and touch. A language-based approach allowed us to scan hundreds of hours of recordings, but it may preclude the study of specific emotions that are difficult to capture with words, such as happiness. Although the scope of this study—with more than 16,000 potential instances of four emotions—did not allow for the coding of video, the keyword and coding approach to locating emotion could be paired with analysis of video. This study sets the stage for further investigation of specific emotions in families as they are conveyed in their entirety—through words, facial expressions, and tone, paired with a hug or high-five.

Despite the relatively small sample, there was great variability among families in the frequency of positive emotion expressions. These differences beg the question: Why do some families express positive emotion six times more often than others? Future research on specific positive emotions could examine possible moderators or delve further into established associations between parental compassion and positive child outcomes in order to pinpoint more specific beneficial behaviors. Overall, our findings are encouraging because they suggest a promising approach to the analysis of large volumes of passively collected naturalistic recordings of family interaction and indicate that differentiating among specific emotions may help uncover their unique functions in families' everyday lives.

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