

## ORIGINAL ARTICLE

# Sulking behavior and the emergence of hurt feelings in young children

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## Abstract

When do hurt feelings develop? The emotion of feeling hurt is vital for close relationships because it signals that one has been devalued illegitimately, potentially eliciting guilt and the motivation to repair in the partner. We approached the question of when hurt feelings develop by studying the emergence of sulking behavior as an indicator of hurt feelings. In an online-questionnaire study, parents and teachers hypothesized that children begin to sulk during the first 3 years ( $N = 125$ ). In a cross-sectional event-based diary study, parents observed their 1- to 8-year-old children ( $N = 40$ ). We found that the youngest child sulked at 20 months of age and that the probability of sulking was at 50% for a child at 25 months. Finally, we conducted a longitudinal event-based diary study where parents observed their children from 16 months on until they sulked for the first time and, at the longest, until their third birthday ( $N = 29$ ). We found that the probability of sulking was at 25% at 21 months, at 50% for a child at 24–25 months, and at 75% at 28 months, thus, confirming and specifying the results of studies 1 and 2. These findings indicate that the emotion of hurt feelings emerges mainly during the end of the second and the third year. We discuss the limitations of our approach and

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why and how the development of hurt feelings in the sense of an appraisal needs to be addressed differently.

**KEYWORDS**

anger, emotion development, hurt, pouting, rejection, sulking

## 1 | INTRODUCTION

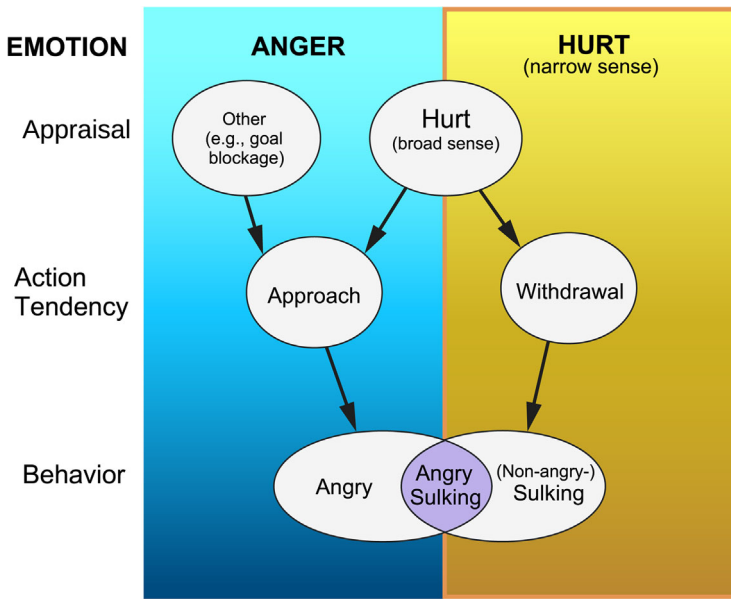
To describe when different emotions develop in human ontogeny is central to the field of emotion development (D'Arms & Samuels, 2019). Anger, for instance, has been found to develop in infants between 2 and 7 months (Lewis et al., 1990; Stenberg & Campos, 1990; Stenberg et al., 1983). Fear appears to develop at 8 months (Emde et al., 1976; Sroufe, 1977; for a critical discussion, see LoBue & Adolph, 2019), and shame, pride, and guilt develop in 2- to 3-year-olds (Cole et al., 1992; Hepach et al., 2017; Stipek et al., 1992; Vaish et al., 2016). However, no study has approached the onset of hurt feelings: at what age do children become capable of feeling hurt?

By “hurt feelings” or synonymously “feeling hurt,” we refer to an affective experience that also is referred to as feeling wronged, harmed, offended, or injured and which can be regarded as one type of social pain (MacDonald & Leary, 2005). Several authors have provided arguments or evidence that feeling hurt is a distinct emotion (Feeney, 2005; Hardecker, 2019; Leary & Leder, 2009; Lemay et al., 2012; Saarni, 1997; Whitesell & Harter, 1996). In line with this view, it has been argued that hurt is the prototypical emotion resulting from social rejection (DeWall & Bushmann, 2011; Gunther Moor et al., 2010).

Feeling hurt typically results from being abandoned, ignored, criticized, teased, or betrayed by someone valued (Feeney, 2005; Leary et al., 1998; Vangelisti et al., 2005). Children feel hurt in similar situations but also when yelled at, punished, or not allowed to do something (Mills et al., 2002). These situations indicate the importance of hurt feelings for children's well-being, and socialization processes. Furthermore, the interpersonal functions that hurt feelings might play—to motivate guilt and repair in the wrongdoer—seem crucial for maintaining relationships (Hardecker, 2019; Lelieveld et al., 2011).

Following the functionalist approach, emotions are multi-componential adaptive responses to events driven by appraisal processes that evaluate the person-environment relationship concerning its significance for the individual (cognitive component). Appraisal processes initiate an action tendency (motivational component), an underlying physiological response (somatic component), and expressive or instrumental behavior (motor component), and a subjective experience (feeling component) that serve to regulate individuals' behavior adaptively (Frijda, 1986; Lazarus, 1991). These emotional reactions also might fulfill specific social functions (Fischer & Manstead, 2016). Here, we focus on hurt feelings' cognitive and motivational components (Lazarus, 1991) and argue that sulking behavior typically might instantiate the expressive component of hurt feelings.

Hurt feelings have been proposed to result from “relational devaluation—the perception that another individual does not regard his or her relationship with the person to be as important, close, or valuable as the person desires” (Leary et al., 1998, p. 1225); a view that has been shared by several other theorists (cf. Hardecker, 2019) and supported by empirical studies (Feeney, 2005; Leary et al., 1998; Lemay et al., 2012). However, such a view does not allow us to distinguish feeling hurt from shame and does not explain why the perpetrators often apologize after hurting someone's feelings (Leary et al., 1998). Thus, it seems that the devaluation needs to be perceived as unjust, unfair, or illegitimate (Dryden, 2007; Feeney, 2005; Mees, 1992; Shaver et al., 1987). Accordingly, we follow Hardecker (2019) in defining feeling hurt in a broad sense as a perceived *illegitimate devaluation*—the appraisal that another individual did something which the “victim” perceives as undeserved or inappropriate and which the victim interprets as signaling that the other individual does not regard him/her to be as important, close, or valuable as he/she desired (Hardecker & Haun, 2020). Notably, an appraisal of illegitimacy might be highly subjective and does not need to be in line with moral transgressions in an objective sense.



**FIGURE 1** Conceptual framework used in our studies

Hurt feelings defined in this way represent an appraisal pattern, not an emotion, and thus also might be part of anger. However, following common language use, hurt feelings also can be defined narrowly by an additional appraisal, an action tendency, and a social-communicative function (Hardecker, 2019) (see Figure 1). More specifically, this includes an appraisal of powerlessness (Feeney, 2004; Hareli & Hess, 2008; Lemay et al., 2012), a tendency to withdraw (Lersch, 1964; Saarni, 1997; Vangelisti & Young, 2000), and thus to communicate a threat to end the relationship; this threat might induce guilt in the perpetrator and thus motivate him/her to give in or to repair (Dryden, 2007; Lemay et al., 2012). Construed in this narrow sense, hurt feelings represent a distinct emotion, which is related closely to humiliation and social disappointment and which is different from anger and sadness (Hardecker, 2019). Here, we focus on hurt feelings in their narrow sense as defined by an appraisal of illegitimate devaluation, powerlessness, and a tendency to withdraw (Hardecker, 2019).

When are children capable of feeling hurt in the narrow sense? In general, emotions only can be inferred from the function of particular behaviors, that is, from the role these behaviors play in interacting with the environment (Campos et al., 2004). Thus, we approach this question by observing sulking behavior—a functional behavior hypothesized to indicate hurt feelings (Dryden, 2007; Eibl-Eibesfeldt, 1989; Hardecker & Haun, 2020). The Merriam-Webster Online Dictionary (2020) defines sulking as being “moodily silent”, and Eibl-Eibesfeldt (1989) describes sulking as a form of withdrawal. Most authors assume that sulking behavior results from appraising an event as unfair, personally devaluing, and difficult to control (Lazarus, 1991; Lersch, 1964; Mees, 1992; Mendell, 2002). Crucially, its social function has been described as withdrawal behavior that communicates one’s harm and a threat to end the relationship. Accordingly, this behavior might appeal to the other person to give in or repair (Eibl-Eibesfeldt, 1989; Mendell, 2002). Thus, the notions of hurt feelings in the narrow sense and sulking behavior appear congruent. Henceforth, we define sulking behavior as withdrawal: breaking off an interaction, and operationalize it as any set of at least four of the following observable cues (Hardecker et al., in press): turning away, physically distancing, gaze avoidance, becoming silent/not responding, lowering the head, crossing arms, pouting lips, lowered eyebrows.

However, one might object against sulking behavior as an indicator of feeling hurt and argue that sulking behavior might also result from anger. Thus, we need to exclude anger as an alternative explanation to infer specifically feeling hurt in the narrow sense from sulking behavior (see Figure 1). Conceptually, we argue that anger involves the opposite action tendency of feeling hurt. Anger often is defined by the tendency to attack or aggress (Carver & Harmon-Jones,

2009; Frijda, 1986) and to force change upon someone by overt threat and by eliciting fear (Fischer & Manstead, 2016; Van Kleef et al., 2004). Presumably, feeling hurt and sulking are defined by the opposite: to withdraw from an interaction and thus to motivate one's partner to repair by eliciting guilt (Lemay et al., 2012; see also Lelieveld et al., 2011).

Furthermore, anger also can result from feeling devalued illegitimately (e.g., Lazarus, 1991), which is from feeling hurt in the broad sense (see Figure 1). In other instances, however, anger might result from other appraisals. As angry behaviors, such as foot-stomping, throwing, or shouting, sometimes accompany sulking behavior—a subtype of sulking we refer to as *angry sulking*—we need to rule out such instances to infer hurt feelings in the narrow sense. Figure 1 summarizes this conceptual framework for the present studies, focusing on the relation between hurt feelings and anger. However, it neglects the relation between hurt feelings and sadness, which needs to be addressed by future studies.

Hardecker and Haun (2020) reviewed contextual evidence on hurt feelings and sulking behavior and concluded that it is likely that hurt feelings in the narrow sense develop together with other self-conscious emotions from the end of the second year and during the third year of life. However, Draghi-Lorenz et al. (2001) convincingly argued that theory had led to substantial bias in the study of early emotional development, as they demonstrated, for instance, for the case of jealousy (see also Hart & Carrington, 2002; Hart et al., 2004). Thus, in this initial phase in the study of sulking behavior and hurt feelings, we began our research using an exploratory approach.

Overall, the present studies aimed to explore at what age children begin to feel hurt, as indicated by the age when they begin to express sulking behavior, and by investigating a broad age range and allowing for the entire range of possible antecedents of sulking. We first conducted a study using an online questionnaire in which we tried to recruit the expertise of parents and teachers of young children regarding the question when sulking emerges (Study 1). Second, we used data from a cross-sectional event-based parental diary study to derive a more specific age model of the emergence of sulking behavior (Study 2). Third, we conducted a longitudinal event-based parental diary study to test the model of the emergence of sulking derived in Study 2 (Study 3). The three studies were built on each other: the first two studies were exploratory and designed to derive increasingly specific hypotheses, the third study was confirmatory and tested the hypothesis of Study 2. To specifically infer feeling hurt in the narrow sense, we excluded anger as an alternative explanation by making explicit the proportion of angry sulking related to non-angry sulking in Study 2 and excluding angry sulking in Study 3 (see Figure 1). Other analyses of studies 1 and 2 are reported elsewhere (Hardecker et al., 2020).

## 2 | STUDY 1: ONLINE-QUESTIONNAIRE FOR PARENTS AND TEACHERS OF CHILDREN BETWEEN 1 AND 8 YEARS

We began our research by conducting an online questionnaire with parents and teachers of 1- to 8-year-olds. Parents and teachers who interact with children every day may share a consensual view of the age at which children show sulking behavior for the first time.

### 2.1 | Method

#### 2.1.1 | Participants

We distributed the online questionnaire mainly in Facebook groups that included large numbers of parents or teachers. One-hundred thirty-nine participants, 107 parents and 31 teachers completed the questionnaire over a predefined period of 5 months. Eighty-six of the parents were from Germany, 15 from the United States, and seven from other diverse countries (France, India, Israel, Netherlands, South Africa, and the United Kingdom) with 92 of them female and 15 male. Of the teachers, 13 were from Germany, one from Austria, and 17 from the United States; 29 of them were female and two male. Teachers had an average class size of 19.3 children ( $SD = 6.1$ ). Fourteen parents were excluded from the analysis because they either reported that their children had not sulked or that their child was older than eight years of age.

## 2.1.2 | Questionnaire

The questionnaire was set up in LimeSurvey, an online-tool for surveys. Participants answered at what age their child had sulked for the first time, by choosing one of the following options: "12–18 months", "18–24 months", "24–36 months", "36–48 months", "> 48 months" and "do not know".

## 2.2 | Results and discussion

Of the parents, 64.9% and 80.6% of the teachers believed that sulking behavior emerges during the first 3 years; 13.8% of the parents and 6.5% of the teachers believed that it developed later than 36 months, and 21.3% of the parents and 12.9% of the teachers did not remember. These results lead to the hypothesis that sulking behavior develops during the first 3 years of life. Because their beliefs might be subject to memory bias and because we did not provide them with a definition for sulking behavior, there might have been uncertainty regarding the specific target behavior. Thus, these results provided us with a first estimation only which we intended to specify in Study 2.

## 3 | STUDY 2: CROSS-SECTIONAL EVENT-BASED PARENTAL DIARY STUDY

We conducted an event-based parental diary study in which parents documented their one to eight-year-old children's sulking behavior for three weeks to derive a first model of the probability for sulking behavior given age. Additionally, we aimed to describe antecedent situations of sulking behavior, which might help design experimental investigations on sulking behavior.

### 3.1 | Method

#### 3.1.1 | Participants

To approach a wide range of possible participants, we placed flyers in six child-medical practices, distributed online notices on Facebook groups that included parents, and phoned parents from our department's database. In a predefined time of 6 months, we recruited 23 German parents (two fathers) who volunteered to participate in the study. The parents were European and rather educated (higher education (German Abitur) 87.5%; secondary school certificate 12.5%). All parents who attended the introduction remained involved for the study's full duration. Parents had a total of 40 children ( $M = 4;2$ , age range [1;4–7;5], 17 females), which fell into two age groups: younger children ( $n = 20$ ,  $M_{\text{age}} = 2;4$  [years, months], age range [1;4–3;7], nine females), and older children ( $n = 20$ ,  $M_{\text{age}} = 5;9$ , age range [5;1–7;5], eight females).

#### 3.1.2 | Materials

We developed a diary sheet which contained 14 questions about the event (see [Appendix](#)) concerning antecedents of the event (what happened before the child started to sulk), the individuals present, the reaction of the child, the reaction of the other individuals present, the subsequent reaction of the child, and how the situation ended. Importantly, parents had to rate which of 48 features (behaviors, postures, facial expressions) children expressed.

**TABLE 1** Studies 2 + 3: Overview on the steps of identifying sulking behavior

Steps of identifying sulking	Study 2	Study 3
1. Definition of sulking given to participants	Main characteristic of sulking: Withdrawal	Definition: Withdrawal: breaking off the interaction.
2. Participants identification of sulking behavior	Identification based on main characteristic and parental intuition	Identification based on definition and criteria: <ul style="list-style-type: none"> <li>• turning away,</li> <li>• physically distancing,</li> <li>• gaze avoidance,</li> <li>• becoming silent,</li> <li>• lowering head,</li> <li>• crossing arms,</li> <li>• pouting lips,</li> <li>• lowered eyebrows</li> </ul>
3. Participant descriptions of sulking behavior (diary sheets)	Checklist of behavioral cues (Behaviors, Gaze Behaviors, Posture, Facial Expression) (cf. <a href="#">Appendix, Q10/13</a> ) Parents rated whether anger was involved (yes/no), with anger defined as actions carried out in an energetic, aggressive, tense and/or loud manner.	
4. Coding of diary sheets	At least one sulking behavior: turning away, going away, gaze avoidance (avoids eye contact or looks down), speaks less or becoming silent For angry sulking one of the following behavioral criteria need to be present: <ul style="list-style-type: none"> <li>• stamps feet</li> <li>• slams the door</li> <li>• throws something on the floor</li> <li>• hits the table or the like</li> </ul>	At least four features of sulking (cf. Checklist, <a href="#">Appendix, Q13</a> ): <ul style="list-style-type: none"> <li>• taciturn or becoming silent = 1</li> <li>• narrowing eyes or lowering eyebrows or raising inner eyebrows = 1</li> <li>• turning away and/or turning head sideways = 1</li> <li>• pouting lips = 1</li> <li>• avoiding eye contact and/or lowering gaze = 1</li> <li>• going away = 1</li> <li>• lowering head = 1</li> </ul> <p>Angry sulking was coded based on Q13 and the narratives (Q2-6), and parents anger judgment by coding anger on a four-point scale (see <a href="#">Appendix</a>)</p> <ul style="list-style-type: none"> <li>• no anger</li> <li>• weak anger</li> <li>• moderate anger</li> <li>• intense anger</li> </ul> <p>The presence of moderate or intense anger AND sulking indicated angry sulking.</p>

### 3.1.3 | Procedure

Parents attended a 90 min introduction in small groups ( $n = 3-7$ ). There, we informed them that the study aimed at describing sulking behavior and that sulking appeared often to be associated with withdrawal (see [Table 1](#)). Furthermore, we notified them that we assume sulking to be different from disappointed, angry, and shameful behaviors, although it might overlap with them. We carefully trained the parents to fill in standardized diary sheets.

First, we explained to them each question on the sheet. Second, we instructed them to use descriptive-observational language (e.g., “child goes away,” “child looks away”) instead of interpretative (e.g., “child *wants* to be alone,” “child *feels* lonely”) or normative-evaluative language (e.g., “child does something *immature*”) for the open questions. Subsequently, parents completed an exercise in which they rated whether each of six sentences would count as descriptive or not. The mean accuracy rate was 82% per person. Third, we trained the parents to fill in the closed ques-

tion on facial, postural, and behavioral features by presenting a picture showing a disappointed adult. In the test phase, parents rated the presence of a posed angry expression. The mean accuracy rate per person in the test phase was 83%.

We instructed parents to observe their children for a total of 21 days and to fill in, as soon as possible, a standardized diary sheet every time they identified their child as sulking but also when they were uncertain whether they should classify an instance as sulking. After they made their first entry, participants contacted the principal investigator and discussed the entry on the phone.

At a final meeting shortly after the 21 days, parents were asked to critically assess their diary-keeping. They answered how easy or difficult it had been for them to recognize the sulking scenes, how easy or difficult the writing had been for them, how many observations they did not manage to write down, and whether they thought their diary-keeping had any effect on the child's sulking behavior. We stressed that adequate answers to these questions were of central interest in this study.

### 3.1.4 | Coding

To account for the parents' holistic impressions and thus potentially to include also subtle forms of sulking, we required only at least one sulking behavior (see Table 1). All episodes that the parents of the young age group identified as sulking were in line with this criterion. Thus, for every child, we coded whether he/she showed sulking or not. Due to the complex relation between sulking behavior and angry behavior (see Figure 1), we coded for all episodes whether angry behaviors were involved (see Table 1).

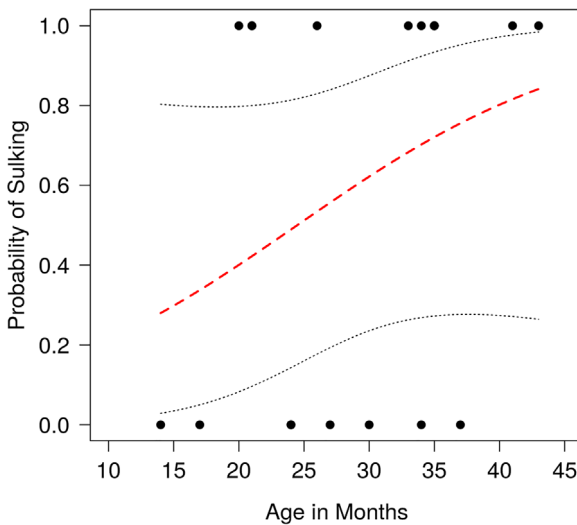
Adjusting the categories of Mills et al. (2002) and Ingram and Bering (2016) to the particulars of sulking, we formed five categories of antecedent situations. Denied permission included situations in which children could not do what they wanted to do due to parent's restrictions or should do what they did not want to do. A related category was discipline, which involved the child being rebuked, punished, or threatened with punishment. Normative violation referred to situations in which property violations occurred, a commitment was broken, the child was treated unfairly, or a child was (falsely) accused. Losing referred to situations in which children did not win in a game or were not the first in other situations. Personal degradation referred to situations in which children were offended, teased, or personally criticized. A research assistant and the first author coded every episode. Interrater reliability across all categories was moderate (Cohen's  $\kappa = .71$ ).

### 3.1.5 | Quality of diary-keeping

On a five-point scale (1 = very easy, 5 = very difficult), parents reported that on average, it had been easy to recognize sulking behavior ( $M = 2.1$ ,  $SD = .91$ ) and that it had been easy to write down what they had observed ( $M = 2.04$ ,  $SD = .71$ ). Four parents reported that they had not written down every episode they observed ( $n = 14$  episodes). Three parents thought their diary-keeping influenced the frequency of their children's sulking in that their children sulked less than usual. Furthermore, parents documented the event times and the time they wrote down the episode. They wrote down 92% ( $n = 98$ ) of the episodes on the same day they occurred, 7% 1 day later ( $n = 8$ ), and only 1% ( $n = 1$ ) of the episodes 2 days later. On average, parents wrote down the episodes 4:30 [hr: min] after the episode had taken place, with a standard deviation of 5:08. Overall, these cues indicate that parents seemed to maintain their diaries effectively.

### 3.1.6 | Data analysis

We specified a Generalized Linear Model with binomial error structure and log link function (McCullagh & Nelder, 1989) to describe the probability of children expressing sulking behavior given age. Sulking was included as a



**FIGURE 2** Generalized linear model for emergence of sulking behavior (Study 2). *Note.* Straight line represents the model curve. Dotted lines represent the 95% Confidence Intervals. X-axis: age in months, y-axis: probability for showing sulking behavior. Data points represent whether a child had shown sulking at this age (1) or not (0) according to the diary observation period or parental report

categorical response variable with two levels and indicated whether a child had shown sulking behavior during the 3 weeks of the study or before or not. Children who did not sulk during data collection also had not sulked before, according to parental reports. We included age as the test predictor and gender as a control factor with female as the reference category. Before fitting the model, we checked the distributions of the predictor and the control variables, which were both equally distributed. We fitted the model in R (version 3.4.4; R Core Team 2018) using the function `glm` (family = binomial). We did diagnostics of model validity and stability (Variance Inflation Factors, leverage, and overdispersion), and none of these indicated highly influential cases or larger or smaller variability in the data than expected based on the model.

## 3.2 | Results

### 3.2.1 | Antecedent situations

Table 3 shows the frequencies for all categories at the level of episodes and at the level of children. Children sulked most frequently when being denied permission or being disciplined.

Over 80% of the children showed sulking at least once when denied permission.

### 3.2.2 | Ontogenetic onset

Twenty percent ( $n = 8$ ) of the children had not shown sulking behavior during the three weeks of the study or before, and they were all in the younger age group. Due to the older children's low variability concerning sulking, 90% ( $n = 18$ ) of the older children sulked during the observation period, the remaining two children sulked not during that period but were reported to sulk usually), we did our analysis with the younger age group (The analysis for the whole age group can be found in the [Appendix](#)). Figure 2 represents the Generalized Linear Model. According to this model, the odds for sulking increased about 9% per month and were at 50% at around 25 months. However, the confidence intervals indicate that the model was afflicted with high uncertainty. Table 2 shows the model coefficients for the Generalized Linear Model.



**TABLE 2** Study 2: Coefficients for generalized linear model

Coefficient	Estimate	SE	p-value	Lower CI	Upper CI
Intercept	-2.21	1.98	<sup>a</sup>	-6.50	1.50
Age	.09	.06	.16	-.03	.23
Gender	-.11	.99	-.12	-2.11	1.89

<sup>a</sup>Left out due to restricted interpretation. Coefficients reported in log-scale.

Every child who showed sulking had at least one episode that did not involve angry behaviors. Overall, 78.8% of episodes did not involve angry behaviors. We argue that this allowed us to infer the ontogeny of hurt feelings specifically in their narrow sense because most instances did not involve cues that indicated anger, and all children showed sulking without angry behaviors.

### 3.3 | Discussion

Here, we analyzed data from a cross-sectional diary study in which we modeled the age at which children began to sulk. Children began to sulk at the earliest during the second half of the second year of life. The probability of having sulked was at 50% with 25 months. Furthermore, we analyzed antecedent situations that caused sulking in 1- to 7-year-olds. "Being denied permission" was the most frequent antecedent situation of sulking behavior. Frequent antecedent situations provide a valuable starting point for experimental studies on sulking behavior. However, these situations were caused mainly by parents. Other situations might have occurred more frequently if other interaction partners also had done the observation.

These results were limited in several ways. First, the sample size was limited, and our model was associated with high uncertainty. Thus, this result is a data-derived hypothesis, not the confirmation of a hypothesis. Second, the identification of sulking behavior was not based on a strict definition yet, and we only provided broad hints to guide the observation of parents. We wanted to explore our question impartially and take into account parental intuition. One could argue that it might have been better not to provide parents with orientation for sulking behavior in the instructions at all (e.g., leave out that sulking might often be associated with withdrawal). On the other hand, one could also argue that we should have provided parents with a comprehensive definition. We decided to compromise both options (a) because, in a pilot study of Study 2, parents insisted on a minimal definition, and (b) because, during this study, there was no coding system for sulking behavior available.

## 4 | STUDY 3: LONGITUDINAL EVENT-BASED PARENTAL DIARY STUDY

Study 2 resulted in the hypothesis that sulking behavior starts to develop at 20 months at the earliest and that 50 % of children have sulked by 25 months. To test this hypothesis and to describe this development in more detail, we conducted a longitudinal event-based parental diary study in which the procedure of Study 2 was enriched and adapted for a longitudinal design, and parents observed their children from 16 months onward.

### 4.1 | Method

#### 4.1.1 | Participants

We acquired participants from a local database of a mid-sized German city. Thirty-six parents participated in one of the introduction sessions. We dropped two of them completely because they stopped responding after the

introduction. Four did not complete the study and quit after 3, 6, 7, and 7 months (one parent moved away and reported not having time anymore, three stopped answering, and we could not reach them anymore). However, we still could use these parents' data for the survival analysis as this analysis can use the data from the times these parents participated actively in a meaningful way. The final dataset comprised 34 parents (female = 26), 33 European, and one Asian. They were highly educated (30 higher education (German Abitur), four secondary school certificate). The mean diary-keeping time was 15.1 months ( $SD = 5.2$ ). Parents began to observe their children ( $n = 29$ , 13 female) when they were 16 months ( $M = 16.3$ ,  $SD = 1.3$ , age-range: [15–19]) and for six children both father and mother participated).

#### 4.1.2 | Materials

We adapted the diary sheet (see [Appendix](#)) and the final interview of Study 2 and used videos for the training session and the inter-rater reliability assessment from previous studies ([Hardecker et al.](#), in press). Two parents sent the PI video recordings of their children's first sulking behaviors, which we also used in the final interview's inter-rater reliability assessment.

#### 4.1.3 | Procedure

The study started with an introductory session, followed by data collection, and ended with an interview.

*(a) Introductory session.* Parents attended an introductory training session similar to the one described in Study 2. However, in this introductory session, parents were informed about the aim of the study, our sulking model, and the sulking features they should look for (arms crossed, pouting lips, lowered eyebrows, lowering head, gaze avoidance, becoming silent, turning away, going away, refraining from participating in joint activities, typical utterances) (see [Table 1](#)). As a permanent reminder, we gave them a colored magnet with all these sulking features written to pin on a very visible place (e.g., fridge). We discussed the differences and overlaps between sulking behavior and related emotional behaviors (anger, shame, disappointment, temper tantrums). They also learned about our definition of sulking behavior as cutting-off an ongoing interaction. The primary instruction we gave them was: "when you observe sulking features or anything that appears to you as sulking, write down that episode and contact the principal investigator. If you are uncertain about your observations, then write it down and contact the principal investigator."

In the training part, parents were trained on the distinction between describing and interpreting as in Study 2. Afterward, they got to know the diary observation sheet, and they watched two sulking videos and described them together verbally. Then, parents watched another sulking video and filled in an observational sheet independently. They discussed their descriptions in detail, and they received personal feedback. We advised them to use present tense and write as stage directions and in a way that allowed someone who was not present to re-enact the situations. In the motivational part, we asked parents to imagine themselves when they had successfully kept their diaries and about the personal benefits, they will have gained. If a parent had no idea, we offered ideas from Study 2. Finally, we discussed the study's organization, and parents could register for the study. We highlighted an explicit option for leaving to foster intrinsically motivated participation and commitment to the study. We followed [Abshire et al. \(2017\)](#) and implemented several retention strategies to reduce drop-out rates (e.g., fridge magnet, study identity, the PI as the single contact person, small gifts).

*(b) Data collection.* Once a month, parents had to confirm that they had read the reminder that we sent via email. We asked them to report potential observations by sending the observation sheet via email or reading it on the phone. Observations were discussed either via email or phone. The PI strictly followed the following protocol and assessed and potentially helped improve (1) the clarity of the writing regarding descriptiveness and concreteness. He assessed (2) the parental intuition of "sulkiness," that is, the clarity and intensity of sulking on a 10-point-scale. Parents often

spontaneously stated when they regarded their observation as the first sulking scene. He also documented (3) whether parents had observed anger in terms of how the child behaved (e.g., tenseness, speed, loudness) or kind of behavior (stomps foot, hits). Finally, he counted the number of sulking features present (4). In case an observation had four or more features, the episode was coded as a sulking scene, and if it was the first of a particular child, asked (1) whether there had been such situations to which the child had now reacted with sulking behavior before, and (2) whether they had noticed anything unusual this situation. We included these questions to preliminarily evaluate the role of environmental factors in the development and expression of sulking behavior.

(c) *Final interview.* When parents had observed sulking behavior and had filled in at least three observation sheets of target sulking behavior, they met with the PI for a final interview, which served to assess parental observations' quality and how sulking developed from its first instance up to now. A warm atmosphere was established, and the following questions were asked: (1) How often did your child sulk since the first time? We included this question because some parents missed describing the second and third instances during the study. Parents estimated how many opportunities their child had to sulk in the last week—on a 4-point-scale (not any, a few, many, a great many). On a five-point scale (1 = very easy, 5 = very difficult), we asked parents to answer how easy or difficult they perceived it to recognize sulking and how easy or difficult they perceived it to write down what they had observed.

#### 4.1.4 | Coding

When both parents participated in the observations of their children, we dealt with as follows: Concerning the question when sulking emerges, we identified the first observation per child, whether coming from the mother or the father. Concerning questions of the final interview, we averaged both parents' answers. However, concerning parental observations quality, we analyzed each parent's answers separately.

For identifying the first sulking per child, we used our classification threshold developed in Hardecker et al. (in press). It requires four sulking features (see Table 1). We further required the absence of anger (see Figure 1). Parent's judgment of anger also was recoded on a four-point-scale (no anger, weak anger, moderate anger, intense anger) by the first author and a Research Assistant blind to the study who recoded 20% of the episodes using the diary sheet (the Coding Scheme can be found in the Appendix). Interrater reliability was good ( $ICC = .74$ ). The first episode with four sulking features and without anger or weak anger was coded with age during the first episode for any child (see Table 1). The first author coded antecedent situations, and another Research Assistant recoded 20% of the episodes. Interrater reliability was good (Cohen's  $\kappa = .82$ ).

#### 4.1.5 | Quality of parental diary-keeping

On average, parents responded to 83.2% ( $SD = 17.9$ ) of the monthly reminders. In the final interview, parents reported it had been neither easy nor difficult to recognize sulking behavior ( $M = 2.83$ ,  $SD = .97$ ), but they found it easy to write down what they had observed ( $M = 1.92$ ,  $SD = .58$ ). Parents agreed moderately to substantially on the holistic clarity and intensity of sulking of three videos on a ten-point-scale ( $ICC = .60$ ,  $n = 27$ ; The first three parents who completed the study did not assess these videos. Two were interviewed before we had the videos; one parent did not come to the final interview.). They rated the first video which showed a precursor of sulking with a mean of 4.3 ( $SD = 1.9$ ), the second which was classified as target sulking behavior with 9.0 ( $SD = 1.1$ ); and the last video which showed target sulking behavior also 5.9 ( $SD = 2.6$ ). This ranking corresponded with the numbers of sulking features present. Regarding feature detection in these three videos, parents rated for each video 22 features and reached, given the number of raters and numbers of variables, a moderate to substantial agreement ( $Fleiss' k = .55$ ). As in Study 2, these cues suggest that parents provided valuable observations.

**TABLE 3** Studies 2 +3: Frequencies of antecedent situations

Antecedent	Study 2- level of episodes	Study 2-level of children	Study 3- level of episodes	Study 3-level of children
Denied permission	79.7 (47)	100 (20)	49 (52)	82.8 (24)
Discipline	11.9 (7)	35 (7)	22 (23)	44.8 (13)
Normative violation	1.7 (1)	5 (1)	12 (13)	37.9 (11)
Losing	0 (0)	0 (0)	13 (14)	37.9 (11)
Personal degradation	1.7 (1)	5 (1)	3.8 (4)	13.8 (4)
Rest/unclear	5.1 (3)	15 (3)	0	0
n	59	20	106	29

Note. For each column, the results are shown as relative frequencies in %, and absolute frequencies in brackets.

#### 4.1.6 | Data analysis

We calculated a Survival-Analysis for the emergence of the first instances of sulking behavior. Survival analysis is concerned with studying the time between one event (e.g., beginning of the study) and another event (e.g., death) (Klein & Moeschberger, 2006). Here, we estimated the duration from birth to the beginnings of sulking behavior by creating a survival object that combined age of child during the study and sulking (yes/no). We calculated the Kaplan-Meier estimation and fitted model curves (lognormal, exponential, weibull, gamma). We choose the best model by inspecting the curve, by preferring simple distributions over more complex distributions, by preferring smaller AICs, and smaller log-likelihoods over larger values of these indices. The sample size for the statistics was  $n = 20$ . We conducted the analysis in R (version 3.4.4, R Core Team 2018) using the function `surv` from the survival package (Therneau, 2020) and the function `flexsurvreg` from the package `flexsurv` (Jackson, 2016). We calculated descriptive statistics for the other measures.

## 4.2 | Results

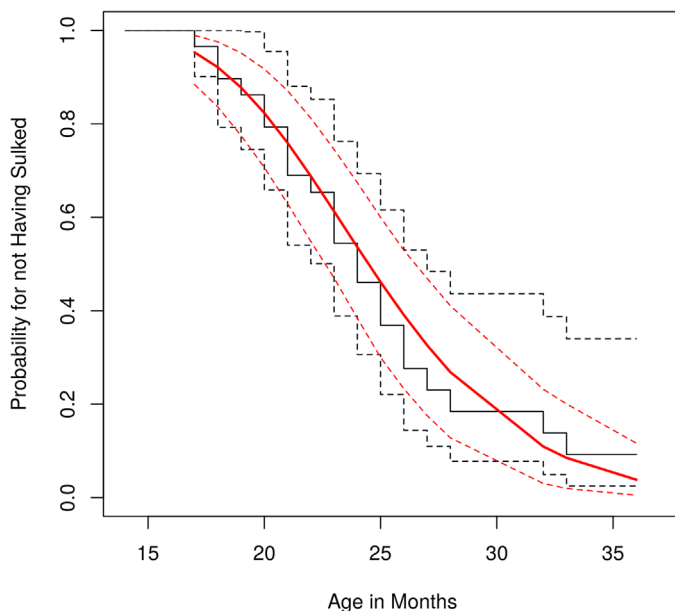
### 4.2.1 | Antecedent situations

Table 3 shows the frequencies for all antecedents. As the episodes are nested in children, we report results at the level of episodes and the level of children. As in Study 2, being denied permission was across episodes the most frequent antecedent, and every child who showed sulking sulked in such a situation.

### 4.2.2 | First instances of sulking

In four cases (13,8%), our classification regarding the first instance of sulking per child conflicted with parents' intuition. Compared to the classification based on our coding system, they regarded an earlier observation as the first sulking instance (both involved angry behaviors). Two parents regarded an instance as the very first sulking that occurred one observation after the one we had classified as the first sulking. In all other cases ( $n = 23$ , 78%), parents were either uncertain or were in line with the coding system. We argue this speaks in favor of the classification threshold used. In five cases (17.2%), parents had not reported any sulking episode until the third birthday. After watching the sulking videos in the final interview, three of these parents (10.3%) reported that they had observed similar behaviors but had not classified them as sulking. They then rated which features were present at such instances and estimated the month

**FIGURE 3** Model for emergence of sulking behavior (Study 3). Note. The straight black line depicts the Kaplan-Meier-estimation, the straight red line depicts the lognormal model curve. The corresponding dotted lines represent the 95%-Confidence Intervals. X-axis: age in months, y-axes: probability for not having sulked



**TABLE 4** Study 3: Coefficients for the lognormal survival model

Coefficient	Estimate	SE	Lower CI	Upper CI
Mean	3.20	.04	3.12	3.28
SD	.22	.03	.16	.29

Note. Coefficients reported in log-scale.

at which the first sulking had occurred. We also included the estimated scenes in the survival analysis which was done with 29 participants (*Events* = 23, *Censored* = 6).

As in Study 2, the lognormal model fitted the data best (Log-likelihood =  $-74.57$ , AIC = 153.1) as compared to the weibull (Log-likelihood =  $-78.46$ , AIC = 160.9), exponential (Log-likelihood =  $-101.5$ , AIC = 205.1), or the gamma model (Log-likelihood =  $-75.3$ , AIC = 154.5). The model is depicted in Figure 3; model components are listed in Table 4. The lognormal model is described by the natural logarithm of its mean (3.2) and standard deviation (.22), with the mean indicating that 50% of the children had sulked by 24.5 months (SD = 1.25). Following the lognormal model, a child has a 25% probability of sulking first by 21 months of age, a 50% probability of sulking by 24 and 25 months, and a 75% probability of sulking by 28 months.

#### 4.2.3 | First sulking behavior as a function of disposition or environment

We also analyzed whether situations in which children had sulked for the first time had occurred before. Additionally, we had assessed whether parents had noticed anything unusual in these situations. However, as this measure was implemented after the quick coding in the telephone session, we lost some data due to different codings in the beginning. Thus, these questions were answered for 13 first sulking instances. (Of the other children, two did not sulk at all, for four children, parents reconstructed the first instances in the final interview, four children's parents answered the question for another instance, four parents did not complete the study, and in the first two cases this question was not asked by mistake.) For 12 out of 13 instances, parents reported that a similar antecedent situation existed before.

Similarly, for 12 out of 13 instances, parents reported nothing unusual about the situation itself. These results indicate that it is unlikely that there had been a disposition present, which was not expressed before the first instance of sulking.

Similarly, in the final interview, parents reported that their children had not any (4.5%, 1), a few (31.8%, 7), many (45.5%, 10), or a great many (18.2%, 4) opportunities to sulk in the last week. This result indicates substantial variation in the sulk-eliciting potential of the families studied. However, the opportunities to sulk still seem extensive, and it is unlikely that environmental factors can explain the duration from the first to the second and third instances of sulking.

#### 4.2.4 | Development of sulking

Beyond the age at the first instance, it seems interesting how sulking behavior develops. When it appears first, how long does it take for the next instance to follow? When does it become a stable part of a child's emotional repertoire? We analyzed the duration from the first to the second and from the second to the third instance for 14 children. For the other 11 children, parents did not document the second episode, but apparently, the third, fourth, or some episode later. The mean distance from the first to the second instance was 3.21 months ( $SD = 3.17$ ; range: 0,10). The mean distance from the second to the third instance was 5.25 months ( $SD = 4.16$ , range = 0,12).

### 4.3 | Discussion

Using a longitudinal parental event-based diary design, we studied the emergence of sulking behavior. Inter-rater reliability between parents indicates that they provided us with valid and reliable observations. Their observations confirm that sulking behavior develops mainly during the end of the second year and the first half of the third year. Thus, we suggest inferring that hurt feelings in their narrow sense develop at the end of the second and beginning of the third year of life.

Children sulked first in situations in which they previously had not been sulking. Furthermore, we found that the duration from the first to the second instance varied substantially, although there existed sufficient opportunities to sulk in all families. These findings indicated that internal factors mainly might drive the emergence of sulking behavior. However, subsequent work needs to address the role of environmental factors in the development of sulking behavior in much more detail.

## 5 | GENERAL DISCUSSION

The three studies presented explored when sulking behavior emerges in young children. Study 1 resulted in the hypothesis that sulking behavior develops during the first three years of life. Study 2 led to a more sophisticated hypothesis that sulking behavior emerges from the second half of the second year to the end of the third year of life. Fifty percent of children have sulked by 24 months. Finally, Study 3 provided the first evidence for this hypothesis. The result is a precise age model of the emergence of sulking and, as we argue, of feeling hurt in the narrow sense. We described antecedent situations of sulking in Studies 2 and 3 and described how sulking develops from its first instances in Study 3. There we found substantial variation between the developmental trajectories. Whereas some children frequently sulked closely after the first instance, other children sulked next only after 10 months.

Evaluating these findings, one must keep in mind that observations depend on the parent's identification of sulking behavior. To improve parental observations, we extensively trained and supervised them in the second and third studies. Furthermore, quality indices of Study 2 and Study 3 point to a relatively high quality of parental reports. However, we can assume that parental observation quality is still less precise and less reliable than the one of trained

scientists. Nonetheless, they provide us with data that we otherwise could not collect: when and how children show sulking *spontaneously* for the first time.

There also are some limitations regarding the samples used. In studies 1 and 2, we used Facebook to recruit participants, which potentially implies systematic population biases. However, the biases concerning parents and teachers seem neglectable (see Baumer, 2018). A more pressing concern is the education level of parents in studies 2 and 3, which was systematically higher than in a representative sample. Additionally, the parents were mostly European, and future studies thus need to investigate whether the findings hold across cultures.

Under these limitations, we argue that our data, in principle, allow us to infer the emergence of hurt feelings in their narrow sense from (non-angry-)sulking behavior (see Figure 1). Accordingly, the findings indicate that hurt feelings develop largely from the second half of the second year to the end of the third year.

One might object to our approach that non-angry sulking behavior indicates and allows us to infer hurt feelings. Children might have used sulking behavior strategically, a behavior we coin symbolic sulking, the deliberate and intentional use of sulking without feeling hurt. If we consider findings on voluntary emotion regulation, though, that is, regulation of emotions based on executive functions (e.g., Bischof-Köhler, 2011; Holodyski et al., 2013; Saarni, 1984), we would not expect this behavior in the third year of life. Furthermore, non-symbolic sulking is likely to develop before symbolic sulking develops (Holodyski et al., 2013). However, future studies should describe symbolic sulking in detail, which would allow us to distinguish it from hurt-based sulking. In our diary studies, we rarely have encountered symbolic sulking, and if it was evident, this was due to children's difficulties in suppressing their smiles (see also Hardecker et al., in press).

Against our approach, one also might argue that sulking behavior does not need to be the consequence of feeling devalued unfairly (feeling hurt, broad sense) but merely might result from one's will being disrespected. Thus, it might reduce to the frustration of the child's need for autonomy. However, the need for autonomy seems to be the predecessor of self-esteem or approval motivation, both phylogenetically and ontogenetically (e.g., Bischof-Köhler, 2011; Cheng et al., 2013), and we highlight that the initial appraisal pattern might be a less complex precursor of adults feeling unfair devalued.

We already have argued why anger seems not an alternative explanation for sulking behavior. First, anger sometimes involves hurt in a broad sense as its core appraisal (Frijda et al., 1991; Lazarus, 1991; Shaver et al., 1987), which might give rise to angry behavioral tendencies, that is, approach-motivated (Carver & Harmon-Jones, 2009) or aggressing tendencies (Frijda, 1986). However, this appraisal might also result in the opposite tendency of avoidance and withdrawal, sulking. Indeed, there are sequences in which a child first gets angry and then turns to sulk. As we wanted to infer hurt feelings, and angry behavior also might be caused by other appraisals than by feeling devalued illegitimately by someone appraised as important (hurt in the broad sense), we focused on non-angry sulking behavior (see Figure 1).

In general, we argue only that non-angry sulking behavior allows us to infer hurt feelings in their narrow sense, which raises the question upon the emergence of hurt feelings in their broad sense. We suggest that this question could be approached by investigating the sensitivity to social rejection. A similar approach has been used in the case of jealousy in which reactions to situations in which babies lost exclusive maternal attention have been studied (Hart & Carrington, 2002; Hart et al., 2004). Crucially, future work needs to conceptualize further the development of the underlying dimensions of hurt feelings regarding subjective fairness and approval/respect.

Interestingly, hurt feelings have never been discussed in the context of research of self-conscious emotions. Both their developmental period and their most frequent antecedent situations that relate to parental discipline and thus to social standards, indicate, however, that hurt feelings are another self-conscious emotion (Bischof-Köhler, 1989; Hardecker & Haun, 2020; Lewis, 2007; Lewis et al., 1989; Stipek et al., 1992).

Our research adds an important topic and finding to the literature on children's emotional development. Previous work has investigated the developmental beginnings of anger, jealousy, fear, guilt, shame, and pride. However, previous research missed investigating the ontogenetic emergence of feeling hurt, an often neglected but distinct emotion (Hardecker, 2019; Leary & Leder, 2009; Leary et al., 1998; Saarni, 1997; Whitesell & Harter, 1996), and the related

emotional behavior of sulking which has been argued to be indicative of feeling hurt (Eibl-Eibesfeldt, 1989; Hardecker & Haun, 2020). Our studies present for the first time that children begin to show sulking behavior and thus hurt feelings from the second half of the second year to the third year of life. It appears that this emotion is critical for children's social life as it indicates that a close person has been disrespectful and signals to this person in a non-angry manner that they should show signs of appeasement.

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## CONFLICT OF INTEREST

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

## ETHICS STATEMENT

Ethical standards of the British Psychological Society were followed throughout conducting this research.

## DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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## SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section at the end of the article.

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