Daily Deviations in Anger, Guilt, and Sympathy: A Developmental Diary Study of Aggression

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Abstract

With a diary study of 4- and 8-year-olds, we tested the association between daily deviations in anger and aggressive behavior, and whether this link was moderated by feelings of guilt and sympathy. Caregivers reported their children's anger and aggression for 10 consecutive days (470 records; $N = 80$, 53% girls). To calculate daily anger deviations from average anger levels, we subtracted each child's average anger score (i.e., across 10 days) from his/her daily anger scores. Children reported their guilty feelings in response to vignettes depicting intentional harm, as well as their dispositional sympathy levels. Multilevel modeling indicated that within-child spikes in daily anger were associated with more aggression (above and beyond between-child differences in average anger levels). However, this association was weaker for children who reported higher levels of guilt. Sympathy levels did not moderate the anger-aggression link. We discuss potential implications for affective-developmental models of aggression and interventions that target anger-related aggression.

Keywords: aggression, anger, guilt, sympathy, childhood, diary study

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Children often express intense feelings of anger through overt aggressive acts with far reaching consequences for themselves and their targets, including peer rejection, mental health problems, and low academic achievement (for comprehensive reviews, see Eisner & Malti, 2015; Lochman, Barry, Powell, & Young, 2010). Guilt and sympathy-related feelings, on the other hand, are thought to highlight the negative consequences of such acts and have been associated with less frequent and less severe aggressive behavior (Arsenio, 2014; Malti & Krettenauer, 2013; van Noorden, Haselager, Cillessen, & Bukowski, 2015). We have theorized that guilt and sympathy may offset the well-established anger-aggression link by serving in stark motivational contrast to anger (Colasante, Zuffianò, & Malti, 2015; Malti, 2015). Recent cross-sectional evidence supports this claim, as guilty feelings in conflict situations and sympathetic tendencies have been shown to counteract the positive relation of dispositional anger and aggression in children and adolescents (Colasante et al., 2015). However, guilt and sympathy have not been tested against *within-child* spikes in *daily* anger, which are often the target of intensive, child-level interventions to reduce aggression (e.g., Lochman & Wells, 2004).

Daily Deviations in Anger and Aggressive Behavior

Aggressive behavior is defined as that which intentionally causes physical harm, psychological harm, and/or distress to others (Krahé, 2013). In the present study, we focused on overt aggressive acts (i.e., open confrontations with the child's environment, such as physical attacks), which are highly visible to caregivers on a daily basis (Björkqvist, Österman, &

Kaukiainen, 1992) and often relate to anger in early and middle childhood (Lochman et al., 2010). Anger is a negative, affective reaction to personal threat, provocation, or the perception thereof. It varies in intensity from mild irritation or annoyance to fury or rage (Lazarus, 1991). Developmental research strongly suggests that anger is related to and expressed through overt aggressive behavior. For example, Eisenberg and colleagues (1999) found that children who displayed more frequent angry reactions during free play at study onset (ages 4 to 6) received higher ratings of outward problem behavior 2 and 4 years later. Anger has also been specifically linked to reactive (i.e., provoked, defensive, and retaliatory) forms of aggression (for a review, see Hubbard, Romano, McAuliffe, & Morrow, 2010). Hubbard and colleagues (2002), for instance, found that 8-year-olds with high levels of reactive aggression displayed more angry non-verbal cues and higher physiological arousal during a competitive, frustration-arousing task. In line with the majority of research to date, we conceptualize anger as preceding aggression in the present analysis (although it is important to recognize that aggressive acts may also exacerbate and/or lead to anger). Cross-sectional and longitudinal studies have documented normative decreases in aggressive behavior (see Eisner & Malti, 2015) and anger (e.g., Murphy, Eisenberg, Fabes, Shepard, & Guthrie, 1999) from the preschool years to middle childhood. These declines may stem from co-developing facets of self-regulation, such as effortful control, and so-called hot executive functioning in emotionally salient situations (e.g., peer conflicts). Both are thought to moderate children's anger-related aggression (Eisenberg, Spinrad, & Eggum, 2010; Zelazo & Carlson, 2012).

Although past studies make a compelling case for the role of anger in children's aggressive behavior, they typically rely on dispositional measures and cross-sectional data, thereby characterizing children as more or less angry *on average*, *relative to each other or their*

peers (e.g., Arsenio, Cooperman, & Lover, 2000; Hubbard et al., 2010; Lochman et al., 2010).

However, like other basic emotions (see Zelenski & Larsen, 2000), anger can be conceptualized

as the product of an emotional predisposition (e.g., an average tendency to react with high levels

of anger) *and* the effect of immediate conditions or situations (e.g., mood-based fluctuations

from one's average level of anger; Deffenbacher et al., 1996; Lonigro et al., 2014; Spielberger,

Reheiser, & Sydeman, 1995). Thus, the extent to which a child's anger on a given day is

considered high or *personally* aggravating to the point of aggression likely depends on his/her

own typical level of anger. This personal "anger threshold" is also likely to vary considerably

from child to child (Kerr & Schneider, 2008).

Guilt, Sympathy, and the Anger-Aggression Link

Guilt is commonly referred to as regret over wrongdoing (Kochanska, Gross, Lin, &

Nichols, 2002; Malti, 2015; Malti & Latzko, 2012). With the exception of neurotic guilt (i.e.,

inappropriate self-blame), guilty individuals rightly accept or anticipate responsibility for

causing or associating themselves with a transgression of internalized moral norms (e.g.,

fairness, justice, caring; Hoffman, 2000). Recent developmental studies have utilized children's

self-reported emotions following hypothetical moral transgressions to assess their guilty feelings

in an experimental setting (Arsenio, 2014). Converging results from this paradigm indicate that

high levels of guilt are related to low levels of aggressive conduct in early childhood (e.g.,

Dinolfo & Malti, 2013), middle childhood (e.g., Malti, 2007), and adolescence (Krettenauer &

Eichler, 2006). A recent meta-analytic review of 42 studies and 8,009 participants between the

ages of 4 and 20 found a significant, negative association between guilt and aggressive

behavioral outcomes ($d = .39$; Malti & Krettenauer, 2013). Overall, these findings suggest that

feelings of guilt highlight the negative consequences of aggressive acts and potentially minimize

the likelihood of their occurrence and/or recurrence (Arsenio, 2014; Malti, 2015). Anticipatory

guilt, for example, may help children forecast the social repercussions of aggressive acts and

adjust their behavior accordingly, whereas painful feelings of consequential guilt may spur the

self-reflection necessary to avoid future aggressive acts. Expressions of guilt appear to increase

in frequency and intensity from early to middle childhood (e.g., Kochanska et al., 2002; Malti,

Eisenberg, Kim, & Buchmann, 2013), which may reflect a gradual internalization of moral

norms (i.e., moving from strict compliance with parental discipline to adopting prosocial norms

as one's own; Hoffman, 2000). The mitigating effects of guilt on aggression, however, have

shown stability from early childhood to adolescence (Malti & Krettenauer, 2013).

Sympathy is a feeling of concern for another that often, but *not always*, stems from a

shared experience of their distress or emotional state. It is frequently confused with empathy,

which always involves sharing another's emotional state, but does *not always* result in concern

for that other (see Eisenberg, 2000). We focused on sympathy in the present analysis because it

necessitates other-oriented concern. Other-oriented concern is likely to motivate children to

reconcile and later avoid aggressive acts against others (rather than empathy alone). In line with

this conceptualization, a growing number of studies have documented a negative link between

sympathy and aggressive behavior in early (e.g., Strayer & Roberts, 2004) and middle (e.g.,

Schultz, Izard, & Bear, 2004) childhood. In their review of 62 studies spanning 3- to 18-year-

olds, van Noorden and colleagues (2015) found that bullying was associated with cognitive and,

in particular, affective empathy (overall associations ranged from $r = -.15$ to $r = -.62$ and $\beta = -.14$

to $\beta = -.44$). Like guilt, feelings of other-oriented concern appear to increase in frequency from

early to late childhood (Eisenberg, Spinrad, & Morris, 2014). This may be attributed to a number

of co-occurring factors, such as: Enhanced cognitive abilities that allow children to assume and

understand others' perspectives (Hoffman, 2000), the integration and coordination of other-oriented emotions and cognitions into children's developing identities (Johnston & Krettenauer, 2011; Malti & Ongley, 2014), the socialization of other-oriented tendencies (Grusec & Hastings, 2015), and the refinement of social-emotional competencies from spending more time with peers (i.e., building positive friendships through sympathy and cooperative behavior; Rubin, Bukowski, & Laursen, 2011). Despite developmental increases in sympathy and the apparent coordination of these related factors, evidence suggests that the negative relation of sympathy-related responding to aggression is just as significant in childhood as it is in adolescence (van Noorden et al., 2015).

Although few studies on aggressive behavior have considered anger and guilt simultaneously, some have jointly examined the roles of anger and empathy. For instance, the combination of anger and empathic deficits has been shown to account for significantly more variance in teacher-reported aggression than either construct alone (Schultz et al., 2004). Empathy (aggregated across child-, teacher-, and caregiver-reports) has also been shown to predict less observed anger and aggression, respectively, in a group of 5-year-olds (Strayer & Roberts, 2004). These findings attest to the independent and, to some extent, joint effects of anger and sympathy-related responding on aggression, but not their interaction.

Given their contrasting nature, anger and guilt or sympathy are likely to interact in multifaceted ways to determine the frequency and/or severity of aggressive outcomes. To account for this, we conducted a recent cross-sectional study with a community sample of 80 4-year-olds, 80 8-year-olds, and 82 12-year-olds ($N = 242$). We tested guilty feelings in contexts of moral transgression and dispositional sympathy as potential moderators of the dispositional anger-aggression link. Interestingly, dispositional anger and aggression were strongly and

positively related, but not for children and adolescents with pronounced guilt and sympathetic tendencies (Colasante et al., 2015). However, the buffering qualities of guilty feelings and sympathetic tendencies have not been tested against dynamic, within-child changes in daily anger and aggression.

The Present Study

From a clinical-developmental lens, chronic fluctuations in anger, rather than high levels of dispositional anger alone, play a central role in aggressive outbursts and the maintenance of aggressive behavioral disorders (Egger & Angold, 2006; Kerr & Schneider, 2008). Children with dysregulated emotions tend to experience them across a relatively broad spectrum of intensity, which increases their likelihood of significant affective deviations (e.g., from one day to the next; Kerr & Schneider, 2008). They are also more susceptible to stressful, anger-inducing triggers on a daily basis (e.g., difficult school material, peer conflicts; Herts, McLaughlin, & Hatzenbuehler, 2012). This uncertainty likely makes it difficult for such children to anticipate and constructively cope with chronic, daily deviations in anger before they manifest as aggressive outbursts. In the present study, we aimed to corroborate this theorizing with a sample of 37 4-year-olds and 43 8-year-olds. Specifically, we examined how the anger of *each child* on *each day* deviated (positively or negatively) from his/her average level of anger across 10 days (in addition to considering between-child differences in average anger levels). We then investigated the unique predictive effect of these daily deviations on caregiver-reported aggression across the same period. By disentangling these distinct sources of anger (i.e., average tendencies and deviations thereof), this approach offered a comprehensive account of children's day-to-day, anger-related aggression. We hypothesized that between-child differences in average anger levels (i.e., being more angry, in general, than one's peers) *and* within-child deviations in

daily anger from average anger levels (i.e., feeling more anger than usual at the personal level),

would be associated with higher levels of aggression.

To build on our previous cross-sectional findings demonstrating guilt and sympathy as

moderators of the dispositional anger-aggression link (Colasante et al., 2015), we considered

point-in-time measures of children's guilt and sympathy in the present study. Specifically, we

examined the extent to which guilty feelings and sympathetic attributes offset the effects of a)

average (i.e., dispositional) anger levels and b) within-child deviations in daily anger. We

expected the aggravating link between average anger levels and aggression, as well as the

aggravating link between daily anger deviations and aggression, to be weakened by high levels

of guilt and sympathy, thereby confirming and significantly extending our previous findings.

Although we expected differences between 4- and 8-year-olds in our main study variables

(i.e., less aggression and anger, and more guilt and sympathy in 8-year-olds versus 4-year-olds;

see Eisner & Malti, 2015; Murphy et al., 1999; Malti et al., 2013), we did not expect to find age

differences in our hypothesized *moderations* because previous studies linking these (or similar)

constructs with samples spanning childhood and adolescence have indicated stability in their

interrelations (Colasante et al., 2015; Malti & Krettenauer, 2013; van Noorden et al., 2015).

Finally, we controlled for socioeconomic status (SES) and sex in light of previous studies linking

SES to aggression (Ludwig, Duncan, & Hirschfield, 2001), anger (Chen & Matthews, 2001), and

sympathy (Eisenberg et al., 2014), and sex to aggression (Nivette, Eisner, Malti, & Ribeaud,

2014), anger (Potegal & Archer, 2004), guilt, and sympathy (Malti & Ongley, 2014).

Method

Participants

A community sample of 37 4-year-olds (Mage = 4.50, SD = 0.41, 21 girls [57%]) and 43 8-year-olds (Mage = 8.45, SD = 0.22, 21 girls [48%]) participated alongside their primary caregivers (N = 80, 42 girls [53%]). They resided in a major Canadian city and were recruited from local community centers, events, and summer camps. All children were fluent in English (speaking and comprehension), as were their caregivers (speaking, comprehension, and writing). As a proxy of SES, caregivers reported their highest level of education with the following breakdown: 4% high school, 22% vocational, 54% bachelor's, and 19% master's/doctoral level (1% chose "other"). The sample's ethnic composition included 40% Western European, 15% South Asian, 8% Eastern European, 4% Latin, Central, and South American, 4% Caribbean, 4% West and Central Asian, 3% East Asian, 1% South East Asian, 1% African, and 17% other/multiple origins (3% chose not to report). Overall, these distributions were representative of the suburban region from which the sample was drawn (Statistics Canada, 2013). The researchers' institution granted ethical approval.

Procedure

The children and caregivers in the current study first took part in our earlier cross-sectional study (see Colasante et al., 2015) for which they attended the research laboratory for a single session. Oral assent was obtained from children and written informed consent from caregivers. Child interviews were conducted in a designated room. They were filmed for data analytic purposes and lasted approximately 30 to 40 minutes. Only the point-in-time guilt and sympathy scores from this interview were considered for the current study. Caregivers remained in a waiting area and completed a questionnaire from which only demographic information was considered in the current analyses. After the interview, caregivers were debriefed while their child was awarded a certificate and an age-appropriate book.

Caregivers then took part in a new, 10-day longitudinal study (i.e., the current study) for which they provided daily assessments of their children's anger and aggression. On each day, caregivers completed an online record for the previous 24 hours. Specifically, they received an e-mail notification at 7:00 p.m. with a link to the record. Although records could have been completed at any time (i.e., they did not expire), research assistants oversaw their timely receipt to ensure they were not amassed over several days and completed simultaneously. Distinct identification numbers ensured that the same caregiver completed all records.

Compliance and missing data strategy. Caregivers completed an average of 5.88 records ($SD = 2.59$, $N = 470$ records). This compliance rate (i.e., data provided for approximately 60% of the expected period) is comparable to other diary studies with similar designs (e.g., Allen, Blatter-Meunier, Ursprung, & Schneider, 2010; Giacomin & Jordan, 2014). Little's Test (Little, 1988) was not significant, χ^2 (349) = 367.81, $p = .23$, indicating that the data were missing completely at random (MCAR). In other words, a missing score on one variable and/or day was just as likely to be missing on another variable and/or day. We therefore handled missing data with full information maximum likelihood (FIML) estimation. This approach has been found to produce reliable estimates under the assumption of ignorable missing data patterns (Enders, 2010).

Measures

Guilt. Children's guilt was assessed in response to two vignettes depicting intentional, aggressive harm. One involved the protagonist stealing from another child and the other involved him/her pushing another child. Both have been extensively validated by previous research in the happy-victimizer paradigm with samples ranging from early childhood to late adolescence (for reviews, see Arsenio, 2014; Malti & Ongley, 2014). They were accompanied by illustrations

matched to the sex of the participating child. Three questions followed each vignette: Question 1 asked, "How would you feel if you had done what (hypothetical victimizer's name) did?" If children said, "I don't know", they were asked, "If you had (behavior of hypothetical victimizer), would you feel a little good, a little bad, or a little good and bad?" Question 2 asked, "Why would you feel (anticipated emotion from Question 1)?" Children's answers were recorded verbatim. Question 3 asked, "How strongly would you feel (anticipated emotion from Question 1)?" Children answered by pointing to a 3-point scale depicting squares of increasing size. Prior to this, 4-year-olds were calibrated with a similar scale depicting animals of increasing size (i.e., a mouse, horse, and elephant corresponding to low, medium, and high intensity emotions, respectively) to ensure they understood the scale format.

   Coding. Our coding method was adapted from past research on children's guilt (Malti & Ongley, 2014; Ongley & Malti, 2014). First, anticipated emotions following Question 1 were coded as 1 (guilt-related emotion) or 0 (not guilt-related emotion). Specifically, bad, a little bad, sad, embarrassed/ashamed, and guilty responses were coded as 1 (guilt-related emotion), whereas neutral, happy, proud, good, a little good, fearful, angry, and other responses were coded as 0 (not guilt-related emotion). Including basic emotional correlates of guilt in our coding (i.e., simplified reports of negative feelings, such as bad, a little bad, and sad) allowed us to examine affective precursors of guilt in younger children who may not be able to explicitly label complex feelings of guilt, but can name their basic emotional correlates and provide consonant moral reasoning (Ongley & Malti, 2014; Tracy, Robins, & Lagattuta, 2005).

   Next, the corresponding reasoning of responses coded as 1 (guilt-related emotion) was consulted to ensure that guilty responses (e.g., "sad because pushing is not fair, he was in line first") were clearly distinguished from other negatively-valenced emotions (e.g., "bad because I

might get into trouble for taking it"). Specifically, children's reasoning following Question 2 was coded as 1 (moral), 2 (sanctions), 3 (hedonism), or 4 (other; Malti & Ongley, 2014). Thus, only responses coded as 1 (guilt-related emotion) for Question 1 and 1 (moral) for Question 2 were retained as guilt-related after this step. In line with previous studies on moral reasoning (Frankfurt, 1988; Malti & Ongley, 2014), we included reasons based on moral norms (e.g., fairness) and conflict resolution in the 1 (moral) category. Sanction-based negatively-valenced emotions were not considered guilt-related because they reflect an orientation toward negative, external consequences for the self, such as being punished by authority figures (e.g., teachers, parents) and rejected by peers. Prior to final coding, two independent raters coded a random subsample ($n = 20$) of anticipated emotions and reasoning from both vignettes. Cohen's κs were .99 and .94, respectively. Disagreements were discussed until a consensus was reached.

For Question 3, the strength of resulting guilt-related emotions was scored as follows: 1 if the child pointed to the smallest square (i.e., not strong guilt-related emotion), 2 if the child pointed to the middle-sized square (i.e., somewhat strong guilt-related emotion), and 3 if the child pointed to the largest square (i.e., very strong guilt-related emotion). A score of 0 was retained for all non-guilt-related emotions. Since intensity scores were positively correlated between vignettes, $r(78) = .48, p < .001$, we aggregated them and used the resulting scores in analyses (see Colasante et al., 2015 for a similar approach). High scores indicated high levels of guilt-related emotions in anticipation of intentionally harming others. The vignettes and guilt scores used in the current study have shown meaningful relations to social behaviors in numerous studies spanning childhood and adolescence (for reviews, see Arsenio, 2014; Malti & Ongley, 2014; for a meta-analytic review, see Malti & Krettenauer, 2013), and across cultures (e.g., Krettenauer & Jia, 2013).

Sympathy. Children responded to five items from Zhou, Valiente, and Eisenberg (2003) depicting needy or unfortunate others (e.g., "When I see someone being picked on, I feel sorry for them"). These items have shown meaningful relations to various measures of social behavior in developmental studies (e.g., Catherine & Schonert-Reichl, 2011; Dinolfo & Malti, 2013). After hearing each item, children were asked if it was "like [them] or not". If they indicated that the item was like them, they were asked if it was "really like [them]" or "sort of like [them]". Responses were coded as follows: "No, this does not sound like me" as 1, "This is sort of like me" as 2, and "This is really like me" as 3 ($\alpha = .87$). We also piloted the items and response scale with 4-year-olds ($N = 11$), who were able to comprehend and respond in full capacity.

Anger. Anger was measured with a single item from Neumann, van Lier, Frijns, Meeus, and Koot's (2011) abbreviated scale of negative emotionality (i.e., "My child felt angry"). Caregivers rated the item on a 9-point scale ranging from 1 = not at all to 9 = very much. Single-item measures have been used to effectively assess emotional states (e.g., Larsen, Norris, McGraw, Hawkley, & Cacioppo, 2009; Russell, Weiss, & Mendelsohn, 1989) and are suitable when repeated sampling (e.g., over 10 days) renders lengthier scales impractical.

Daily anger deviations. As depicted in Figure 1, we computed 10 daily anger deviation scores by subtracting each child's average anger score (i.e., across all 10 days of study) from his/her daily anger scores. A positive deviation represented feeling more anger than usual on that particular day. A negative deviation represented feeling less anger than usual on that particular day.

Aggressive behavior. Aggressive behavior was assessed with three matched items from the narrow-band Aggressive Behavior syndrome scales of the Child Behavior Checklists (CBCL) for 1.5- to 5- and 6- to 18-year-olds (Achenbach & Rescorla, 2000, 2001; e.g., "My child was

mean to others, fought with others, or bullied them"). These items have comprised abbreviated

aggression scales in previous developmental studies (e.g., Neumann et al., 2011). Caregivers

rated them on a 9-point scale ranging from 1 = not at all to 9 = very much. The average α across

10 days was .80 (αs ranged from .73 to .87), indicating good internal consistency. As expected

from previous studies (see Lochman et al., 2010), aggression showed moderate to strong positive

correlations with anger on each day of the study (average r = .70; rs ranged from .40 to .85, ps <

.01), thereby attesting to the scale's construct validity.

Analytic Strategy

Given the nested structure of our data (i.e., daily measures of anger and aggressive

behavior nested within children), we used multilevel modeling (MLM) in HLM 7 (Raudenbush,

Bryk, Cheong, Congdon, & Du Toit, 2011). First, we identified the best-fitting trajectory of

children's aggressive behavior across the 10 days of study by assessing its mean-level

development with four progressively complex models of change (i.e., stability, linear, quadratic,

and cubic). To compare the fit of these nested models, we used the likelihood ratio (LR) test.

When the LR test of two models was not significant, we retained the model with fewer estimated

parameters for the sake of parsimony (West, Ryu, Kwok, & Cham, 2011).

We then proceeded to test a series of two-level MLMs predicting aggressive behavior at

Level 1. Daily anger deviations was a time-varying predictor at Level 1, whereas average anger

levels, guilt, and sympathy were time-invariant predictors at Level 2. Age, SES, and sex were

also included as control variables at Level 2. To test our hypotheses concerning the moderating

effects of guilt and sympathy, we first included the cross-level interaction terms of daily anger

deviations x guilt and daily anger deviations x sympathy. Second, we assessed the Level 2

interactions of average anger levels x guilt and average anger levels x sympathy. We also

explored cross-level interactions with our other study and control variables (i.e., average anger levels, age, SES, and sex) to thoroughly account for potential moderators of the anger-aggression link and ensure that our core findings remained intact. However, to maintain model parsimony and ease the interpretability of our findings, only significant interaction terms were retained in our final model (Cohen, Cohen, West, & Aiken, 2003).

We followed the centering within context (i.e., child) approach (CWC2) as described by Kreft, de Leeuw, and Aiken (1995; also see West et al., 2011). The CWC2 approach allowed us to distinguish within- and between-child variability by using two different centering procedures for Level 1 and Level 2 predictors. At Level 1, daily anger deviations were person-mean centered within children (i.e., by computing the average of each child's *own* anger across 10 days and subtracting it from his/her daily anger scores). With the exception of sex (coded -0.5 for girls and .05 for boys), all Level 2 variables (i.e., average anger levels, guilt, sympathy, age, and SES) were grand-mean centered between children.

Results

Descriptive Statistics

Descriptive statistics and zero-order correlations between study and control variables are displayed in Table 1. Aggressive behavior was positively related to anger (both averaged across 10 days) and negatively to guilt and sympathy. Eight-year-old children were less likely to exhibit aggression and anger than 4-year-old children, and more likely to express guilt and sympathy.

Predicting Aggression from Daily Deviations in Anger, Guilt, and Sympathy

The stability model with a random intercept only (i.e., no mean-level changes in aggressive behavior over 10 days; deviance = 1638.97, three estimated parameters) fit the data better than the linear ($LR = 2.29$, $df = 3$, $p > .50$), quadratic ($LR = 5.32$, $df = 7$, $p > .50$), and cubic

($LR = 5.44$, $df = 8$, $p > .50$) models. Thus, the mean-level development of aggressive behavior was best characterized by stability (intercept fixed effect = 2.45, $p < .001$) and we proceeded to predict the significant variability among children around this average level (intercept random effect = 1.02, $p < .001$).

  As reported in Table 2 (Model A), increases in within-child daily anger deviations at Level 1 predicted higher mean levels of aggressive behavior (while controlling for the positive effect of between-child average anger levels at Level 2). We then entered average anger levels, guilt, sympathy, age, sex, and SES at Level 2 as cross-level interaction terms predicting the Level 1 slope of daily anger deviations. When these terms were entered separately, only daily anger deviations x guilt was significant, $b = -.08$, $SE = .036$, $p = .02$. When entered together, daily anger deviations x guilt, $b = -.10$, $SE = .032$, $p = .001$, and daily anger deviations x sex, $b = -.18$, $SE = .061$, $p = .005$, were significant. We dropped non-significant cross-level interactions from the equation (i.e., daily anger deviations x average anger levels, daily anger deviations x sympathy, daily anger deviations x age, and daily anger deviations x SES, $ps > .32$). As shown in Table 2 (Model B), both daily anger deviations x guilt and daily anger deviations x sex remained significant at this step. Next, we added the Level 2 interactions of average anger levels x guilt and average anger levels x sympathy (both separately and simultaneously). The interaction of average anger levels x guilt was significant controlling for the significant cross-level interaction of daily anger deviations x guilt (Table 2, Model C). Since the interaction of average anger levels x sympathy was not significant, we dropped it from the final model.

  Compared to the null model (i.e., without predictors), Model C greatly reduced the amount of unexplained variance at each level of analysis ($Pseudo\text{-}R^2_1 = .49$, $Pseudo\text{-}R^2_2 = .67$). We conducted simple slopes analyses to probe the significant interactions (Cohen et al., 2003).

The positive effect of daily anger deviations on aggressive behavior was weaker for children with high (+1 *SD*) levels of guilt, β = .33, *p* < .001, in comparison to those with medium, β = .44, *p* < .001, and low (-1 *SD*) levels, β = .56, *p* < .001 (Figure 2). Similarly, the effect of average anger levels on aggression was weaker for those with high (+1 *SD*) levels of guilt, β = .31, *p* < .001, in comparison to those with medium, β = .45, *p* < .001, and low (-1 *SD*) levels, β = .60, *p* < .001. The positive effect of daily anger deviations on aggression was stronger for girls, β = .52, *p* < .001, than boys, β = .35, *p* < .001.

Finally, we investigated age and sex differences in the moderating effects of guilt by testing the three-way interactions of daily anger deviations/average anger levels x guilt x age and daily anger deviations/average anger levels x guilt x sex. Since none of these were significant, we dropped them from the model.

Sensitivity analysis. To ensure the robustness of our findings and control for undesirable biases from estimating a significant portion of missing data, we re-ran Model C with a reduced subset of participants who provided data for at least 4 of 10 records (*N* = 60). Importantly, the focal interaction of daily anger deviations x guilt was still significant, *b* = -.14, *SE* = .032, *p* < .001. The interactions of average anger levels x guilt, *b* = -.22, *SE* = .062, *p* = .001, and daily anger deviations x sex, *b* = -.13, *SE* = .063, *p* < .05, also remained significant.

Discussion

In their everyday lives, children encounter multifaceted social conflict situations that elicit angry, guilty, and sympathetic feelings with important implications for their aggressive behavior (both aggravating and protective; Cooley, Elenbaas, & Killen, 2012; Malti, Killen, & Gasser, 2012; Schultz et al., 2004). However, clinical and developmental research to date has mostly considered between-child differences in the independent effects of these emotions on

aggression. With a daily diary methodology and multilevel modeling, we aimed to provide a novel, dynamic account of 4- and 8-year-olds' aggression, anger, feelings of guilt and sympathy, and the interrelations thereof.

In line with existing literature (see Lochman et al., 2010), higher levels of average anger (i.e., across 10 days of study) predicted higher levels of aggression at the between-child level. Above and beyond this effect, we found that positive daily deviations from average anger levels predicted more aggression at the within-child level. This suggests that children's aggression is uniquely exacerbated when they feel more anger than usual. Interestingly, average anger levels and daily anger deviations did not interact. So, regardless of children's average level of anger, how they *fluctuated* around their respective average meaningfully accounted for their aggressive acts. Even when children had relatively low levels of anger on average, positive deviations from their norm were just as powerful in predicting aggressive outcomes. Since fluctuations in anger have been implicated at the core of aggressive behavioral disorders in children (Egger & Angold, 2006), these findings may extend current theorizing and practice. Specifically, understanding the nature of a child's average anger level and recognizing when his/her situational anger rises above that threshold may be informative to prevent angry episodes from escalating into aggression. Recent tools to promote emotion regulation in children with the detailed recording of day-to-day affective experiences (e.g., Renati, Cavionia, & Zanetti, 2011) may help clinicians recognize and mitigate the circumstances that trigger surges in anger and related aggressive acts.

Our other main aim was to test guilty feelings and sympathetic tendencies as potential moderators of the daily anger deviations-aggression link. In line with our expectations, the aggravating link between daily anger deviations and aggression was weaker for children with relatively high levels of guilt. Feelings of guilt in anticipation of intentionally harming others

may outweigh feelings of anger that would otherwise lead to aggression. Instead of externalizing anger towards others (e.g., via aggressive retaliation), children's guilty feelings may shift their attention away from anger-inducing stimuli by highlighting the moral salience of situations and decreasing the attractiveness of aggressive reactions (see Eisenberg et al., 2014; Malti & Latzko, 2012). To further understand *how* and *why* guilt disrupts the anger-aggression link, future studies should account for negative daily events that may elicit feelings of anger *and* guilt (e.g., conflicts with siblings at home or peers at school). Interestingly, the aggravating link between average anger levels (between children) and aggression was also weaker for those with relatively high levels of guilt. This corroborates our previous findings (Colasante et al., 2015) and further suggests that guilty feelings in social conflict situations protect children from developing stable tendencies of anger-related aggression (in addition to helping them navigate *daily* spikes in anger).

Overall, these findings support the use of guilt induction in the active monitoring and intervention of children's daily aggressive conduct. For example, practitioners, educators, and caregivers could facilitate guilt by recognizing conflict situations, highlighting the other's perspective, pointing out the other's distress, and making it clear that the transgressing child is responsible for such distress (see Hoffman, 2000). Over time, this may result in children consistently weighing the potential harm of aggressive acts against their own desires to act on feelings of anger and frustration. Despite existing findings demonstrating the aggression reducing properties of guilt across childhood and adolescence (see Malti & Krettenauer, 2013), and despite the various existing intervention programs that emphasize empathy-based emotional responses (see Malti, Chaparro, Zuffianò, & Colasante, 2016), the standardized use of self-oriented guilt promotion strategies has been largely non-existent. Such strategies could be built

into existing interventions, such as the Coping Power Program and earlier Anger Coping

Program (Larson & Lochman, 2002; Lochman & Wells, 2004), as a unique group-based strategy

in which common aggression-inducing situations could be role-played with feedback from peers.

This strategy may work particularly well during the transition from early to middle childhood, as

children's peer relations become increasingly paramount and they develop the cognitive skills to

coordinate multiple perspectives and (potentially) recognize the negative consequences of

aggressive acts on their own accord (Malti & Ongley, 2014). Relatedly, children who lack guilt

because they a) have yet to develop this capacity or b) exhibit callous-unemotional tendencies

may require intensive, one-on-one training (as opposed to those who demonstrate the capacity

for guilt, but require the above mentioned "social-calibration" exercises to understand when to

feel guilt and how much to feel it). Finally, the active facilitation of guilt should be timely and

built into situations that involve relatively serious transgressions with a clear line of

responsibility. Such situations are likely to be affectively charged and memorable, thus

representing good opportunities for enduring learning. This focus on specific situations is

important as over-promoting guilty feelings may lead to neurotic guilt (i.e., blanketed feelings of

blameworthiness that are disproportionate to the amount of wrongdoing caused) and related

internalizing symptoms (Malti, 2015). For example, Zahn-Waxler and Van Hulle (2012) found

that children with parents who chronically induced guilt were more likely to become over-

involved in family problems and experience episodes of anxiety, depression, and low self-

esteem.

  Although our correlational analysis confirmed previously established age differences in

our main study variables (i.e., children from middle childhood were less likely to show anger and

aggression and more likely to report guilt and sympathy than those from early childhood; see

Eisner & Malti, 2015; Murphy et al., 1999; Malti et al., 2013), we did not find developmental

differences in the moderating effects of guilt. In line with our previous findings (Colasante et al.,

2015), this may indicate that guilt operates as an anger-aggression buffer from early to middle

childhood. This finding also resonates with meta-analytic data demonstrating a consistent,

negative relation between guilt and aggression from age 4 to 20 (Malti & Krettenauer, 2013).

As expected and in line with previous findings (e.g., Strayer & Roberts, 2004), zero-order

correlations showed that sympathetic tendencies were negatively associated with aggressive

behavior and anger. In contrast to our hypotheses, however, sympathy was unrelated to

aggressive behavior when anger and guilt were controlled for and it did not interact with anger.

Interestingly, the buffering effects of guilt trumped those of sympathy. This might be related to

measurement differences in guilt and sympathy. Specifically, our measure of guilt was assessed

across two situations involving intentional harm. This aligns with our moderator and outcome of

interest (i.e., situational anger and aggressive outbursts in the harm domain). Our child-reported

sympathy measure, on the other hand, tapped into dispositional, sympathetic tendencies in the

caring/prosocial domain (e.g., often feeling sorry for others who are less fortunate). These

differences in alignment across measures may partially explain why we found significant

relations between anger/aggression and guilt (i.e., relatively situational measures in the same

domain), but not sympathy.

In addition to guilt and sympathy, we explored interactions between daily anger

deviations and average anger levels, age, SES, and sex to account for other potential moderators

of the anger-aggression link. Sex interacted with daily anger deviations. Positive spikes in daily

anger were more aggravating for girls than boys. This result may reflect a greater sensitivity on

behalf of girls to daily events that trigger anger, such as peer conflict, and may stem from girls'

relative proneness to negative emotionality (e.g., Mezulis, Priess, & Hyde, 2010). However, beyond the age of 4 or 5, literature has shown mixed sex differences in the threshold that anger must cross to trigger overt aggression (Potegal & Archer, 2004), so this interaction should be interpreted with caution.

Although we utilized a diary method, interview procedures with realistic vignettes, and multiple informants to reduce the chance of undesirable biases (e.g., common-method variance), our study provided little in terms of causal explanations. While we do believe that our findings uphold the possibility that anger-related aggression is disrupted by feelings of guilt, replication studies are needed. For example, future experimental studies could manipulate anger- and aggression-eliciting situations to delineate the effects of guilt. Studies with longitudinal designs that systematically investigate changes in guilt as they relate to changes in the anger-aggression link may also yield meaningful extensions of the current findings. We also relied on a measure of overt aggressive conduct, whereas studies have revealed other subtypes of aggressive behavior with differential relations to anger (e.g., reactive versus proactive, physical versus relational; Crick, Ostrov, & Werner, 2006; Hubbard et al., 2010). Despite the utility of differentiating between aggressive subtypes, the intensive, daily design of the current study meant that we could only ask caregivers a limited number of questions. As a result, we chose to focus on select, well-validated items from the CBCL. It is still important to note that our current measure (or how caregivers rated it) may have reflected reactive more than proactive aggression. In early to middle childhood (i.e., the age range of the current study) aggressive behavior is almost exclusively reactive (for a review, see Eisner & Malti, 2015). As children develop over early/middle childhood, self-regulatory capacities increase and reactive aggression recedes. In turn, growth in proactive aggression dominates in later childhood and adolescence (Vitaro &

Brendgen, 2005; see Bierman & Sasser, 2014 for recent empirical support of this sequential developmental model). Thus, although we technically measured "generalized" overt aggression, it is quite possible that we primarily tapped into reactive aggression. Finally, we used a single item to assess daily anger. Although repeated measures of this 9-point item across 10 days produced significant variability, it may be fruitful for future studies to consider multiple dimensions of anger, such as annoyance and rage, to determine their relative fluctuating tendencies and impacts on aggression.

To conclude, the present study was the first to decompose the average and fluctuating components of children's anger, demonstrate their distinct relations to aggression, and highlight the role of guilt in moderating this dynamic anger-aggression link. In their everyday lives, children encounter multifaceted conflict situations with peers, caregivers, and teachers that elicit a diverse range of emotions – from amoral to moral, self- to other-oriented, and inclusive. If practitioners are able to tip the affective scales of children with high levels of aggression away from anger and towards feelings of guilt, they may help them navigate towards prosocial solutions to conflicts. As our findings suggest, such strategies may be most effective on days when children feel more anger than usual and are thus more likely to inflict harm on others.

Compliance with Ethical Standards

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Table 1

Descriptive Statistics and Zero-Order Correlations

Variables	1	2	3	4	5	6	7	*M*	*SD*
1. Aggressive behavior	—							2.43	1.15
2. Anger	.63***	—						3.27	1.66
3. Guilt	-.37***	-.15	—					1.61	0.97
4. Sympathy	-.31**	-.37***	.36***	—				1.97	0.67
5. Age	-.26*	-.23*	.42***	.64***	—			6.62	2.01
6. SES	-.07	-.02	.01	.09	.08	—		—	—
7. Sex	.08	.13	-.17	-.05	.10	.25*	—	—	—

Note. Aggressive behavior and anger = average across 10 days. Scale ranges: aggressive behavior and anger (1-9), guilt (0-3), and sympathy (1-3). Sex: girls = -0.5 and boys = 0.5. *$p < .05$. **$p < .01$. ***$p < .001$.

Table 2

Two-level MLMs Predicting Aggressive Behavior

	Model A			Model B			Model C		
	Coefficient	*SE*	*p*	Coefficient	*SE*	*p*	Coefficient	*SE*	*p*
Fixed effects									
Intercept (B_{00})	2.48	.084	< .001	2.48	.083	< .001	2.43	.079	< .001
Sex (B_{01})	0.22	.148	.15	0.06	.167	.73	0.05	.163	.76
Age (B_{02})	-0.05	.039	.23	-0.04	.041	.31	-0.04	.035	.20
SES (B_{03})	-0.04	.085	.61	-0.06	.091	.52	-0.03	.082	.74
Sympathy (B_{04})	0.05	.129	.67	0.04	.131	.75	0.09	.123	.48
Guilt (B_{05})	-0.12	.073	.11	-0.23	.087	< .01	-0.24	.088	< .01
Average anger levels (B_{06})	0.47	.044	< .001	0.47	.045	< .001	0.47	.046	< .001
Average anger levels x guilt (B_{07})	—	—	—	—	—	—	-0.16	.056	< .01
Daily anger deviations (B_{10})	0.43	.038	< .001	0.43	.033	< .001	0.43	.033	< .001
Daily anger deviations x sex (B_{11})	—	—	—	-0.18	.061	< .01	-0.17	.061	< .01
Daily anger deviations x guilt (B_{12})	—	—	—	-0.10	.032	.001	-0.11	.032	.001
Random effects									
Level 2									
Intercept (r_0)	0.37	—	< .001	0.36	—	< .001	0.34	—	< .001
Daily anger deviations slope (r_1)	0.05	—	< .001	0.03	—	< .001	0.03	—	< .001
Level 1 (e)	0.79	—	—	0.79	—	—	0.78	—	—

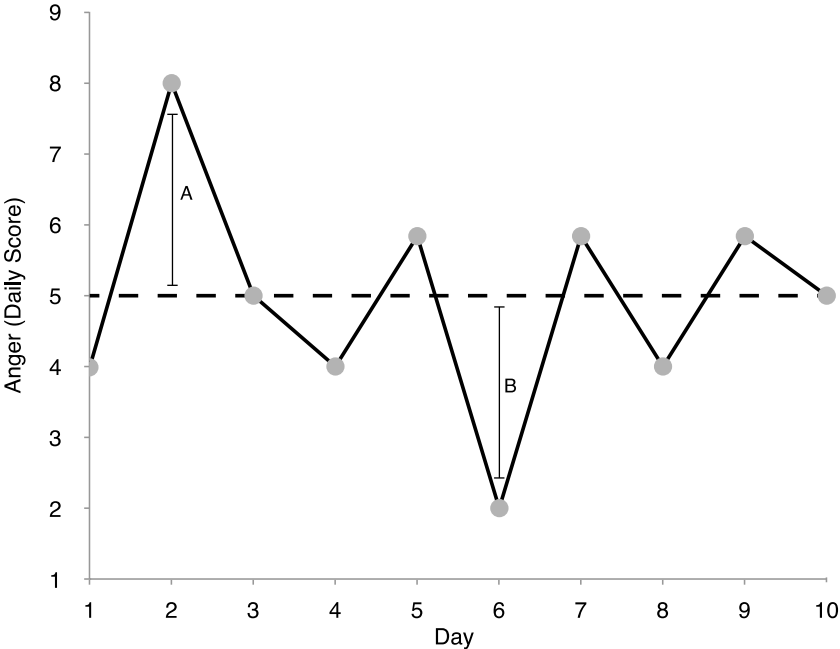*Note.* Aggressive behavior and average anger levels = average across 10 days.

Figure 1. Graphical depiction of positive (A) and negative (B) daily deviations in anger from

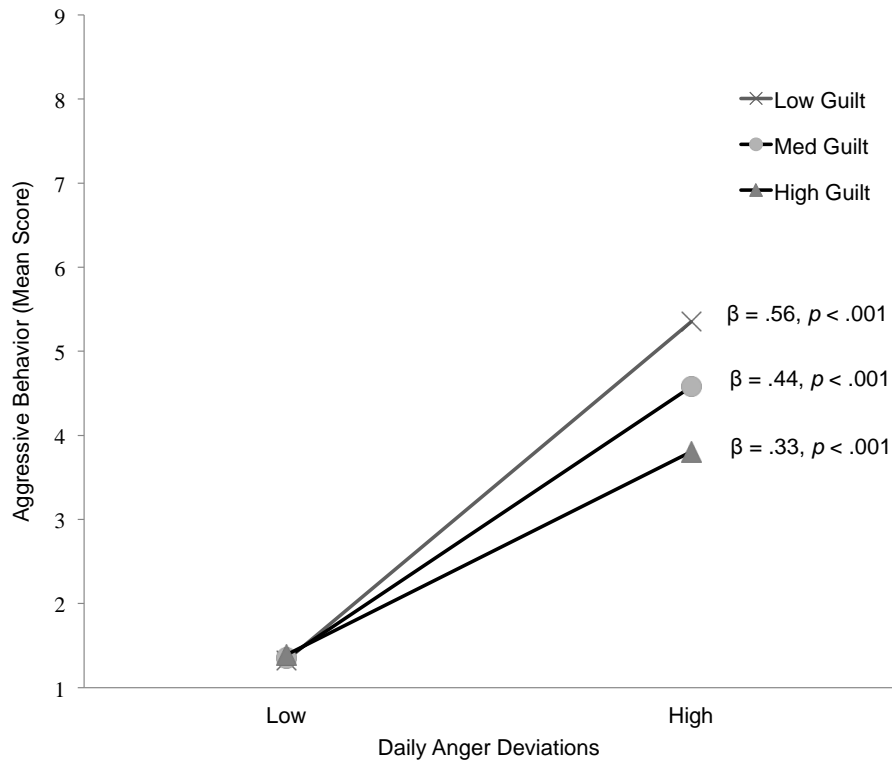average anger level (dotted line) at the intra-individual level.

Figure 2. Daily anger deviations in relation to aggressive behavior at low (-1 *SD*), medium, and

high (+1 *SD*) levels of guilt.