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Anger Expression and Persistence in Young Children

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Abstract

This study investigated anger expression during toy removal (TR) in 92 young Chinese children, two to five years of age, and its relations to their persistence in responding to obstacles during two challenging tasks with highly desirable goals [TR and locked box (LB)] and one challenging task with a less desirable goal [impossible perfect circles (IPC)]. Anger expression during TR was positively associated with persistence during TR and LB but not during IPC. The results highlighted the positive effects of anger in the development of persistence.

Keywords: anger; persistence; children

Introduction

Anger is a basic negative emotion that plays an important role in children's social development (Dennis, Cole, Wiggins, & Cohen, 2009; Eisenberg et al., 2007). It is elicited by situations in which goal-oriented activities are blocked and by events perceived to offend against oneself or others (Averill, 1983). Anger can impair judgment, which may lead to an aggressive response toward others (Lemerise & Dodge, 1993) and to rejection by peers (Hubbard, 2001). Yet anger can be useful sometimes (Averill, 1983; Tiedens, 2001), as it relates to approach motivation when goals are blocked (Carver & Harmon-Jones, 2009), intensifies effort to overcome obstacles (Campos, Campos, & Barrett, 1989), and facilitates adaptive persistence in goal pursuit (Lench & Levine, 2008; Lewis, Sullivan, Ramsay, & Alessandri, 1992). However, these positive effects have not been fully examined in young children. Thus, the current investigation addresses this gap by focusing on the adaptive function of anger during goal blockage and its correlations to persistence in a sample of young Chinese children at two to five years of age.

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From a functionalist perspective, anger motivates an individual to orient toward a goal and eliminate barriers (Campos et al., 1989); it can be viewed as both an energizer and an organizer of behaviors (Nabi, 1998). Emerging evidence in the literature is consistent with this functional perspective. In adult studies, the threat of a goal failure elicited a range of negative affects such as sadness, anger, and fear, but only the elicitation of anger predicted more time spent on subsequent tasks (Lench & Levine, 2008). Concerning early development, previous researchers have indicated that anger-prone infants exhibited strong approach behaviors toward the goals of the various tasks (Derryberry & Rothbart, 1997; Fox, 1989; Kochanska, Coy, Tjebkes, & Husarek, 1998; Rothbart & Bates, 2006). Anger during goal blockage in infants was associated with perceived control, increased persistent instrumental activities (e.g., arm pulling) to overcome the obstacle, and increased positive emotions (e.g., interest and joy) once the obstacle was removed (Lewis & Ramsay, 2005; Lewis, Ramsay, & Sullivan, 2006; Lewis et al., 1992). Kearney (2004) found that high anger-prone infants at seven and nine months of age were more likely to complete the frustrating task and were described by their mothers as knowing what he or she wants and getting it. In contrast, high distress-prone infants showed more helpless postures and a higher degree of flight behaviors, and none of them completed the frustrating task. Hence, anger might be accompanied by greater persistence during goal blockage in children.

However, several studies have found a negative correlation between child anger and persistence (e.g., Deater-Deckard, Petrill, & Thompson, 2007; Eisenberg et al., 2004; Yang & Liu, 2008). Importantly, these studies involved regulatory behaviors such as inhibitory control (i.e., modulating a dominant approach response). For example, children had to inhibit cheating (i.e., looking at the answer to the puzzle) when working on a challenging puzzle task (Eisenberg et al., 2004). Or children were instructed to wait during a delay-of-gratification task (Yang & Liu, 2008). According to a dimensional model of affect, anger, like happiness, is associated with approach motivation to blocked goals (Carver & Harmon-Jones, 2009; He et al., 2010). Thus, attempts to solve the puzzle by cheating or getting the desired toy despite instructions to wait by children who are easily angered involve rule breaking. Numerous studies suggested that children prone to anger are poor at such inhibitory control (He et al., 2010; Kochanska, 2003). Therefore, anger would not lead to persistence when greater inhibitory control is required (Derryberry & Rothbart, 1997).

The present study extended this area of research by examining whether anger was related to adaptive persistence to engage in challenging tasks, in which inhibitory control or regulation of approach motivation was not necessary. Furthermore, the value of the particular goals strongly influences children's ongoing motivation and performance (Pekrun, Elliot, & Maier, 2009). When facing blocked but highly desirable goals, angry children increased their effort to achieve them (Dennis et al., 2009). However, if the goals are not attractive, easily angered children might not exhibit great persistence.

The Present Study

This study builds on and expands previous research on anger expression in young children and its relations to specific behavioral tendencies by (1) focusing on the adaptive function of anger in response to goal blockage and (2) examining persistence during goal blockage paradigms with highly desirable goals [attractive toys in toy removal (TR) and locked box (LB)] and a comparison paradigm with a less desirable

goal [to draw a perfect circle in impossible perfect circles (IPC)]. It was predicted that anger expression during TR would be associated with greater persistence during TR and LB, in which children were highly engaged and motivated to get the attractive toy, but not in IPC, in which children might not be motivated so much and the goal (to draw a perfect circle) was not so attractive for the children.

Method

Participants

Participants were 92 young children (41 boys, 51 girls; *M* age in months = 37.17, *SD* = 8.17; range: 23.4–59.2 months) recruited from local preschools in a Chinese city. Letters were sent to inform parents about this study. If they expressed interest, follow-up telephone calls explained the study in more detail. If the mother agreed to participate, she and her child were invited into the laboratory. An informed consent was obtained from the mother before testing began. All the participants were from intact, middle-class, single-child families; the majority of the mothers were college graduates (89.1 percent).

Procedure

Children and their mothers participated in a laboratory visit consisting of a series of tasks as part of a larger project. For the current study, three tasks were included: TR was used to both elicit anger and evaluate persistence among the children. LB and IPC were used to assess persistence alone. These three tasks differed in goals, with TR and LB having tangible and more desirable but blocked goals and with IPC having a less desirable performance goal. Each task was followed by a positive experience such as puppet play to eliminate the potential carryover of negative affect. The tasks were videotaped through multiple-way cameras mounted near the ceiling in the four corners of the room, and were administered in the same order for all children.

Measures

TR. This task was modified from the preschool laboratory temperament assessment battery (Lab-TAB) (Goldsmith, Reilly, Lemery, Longley, & Prescott, 1994), and from a study conducted by Buss and Kiel (2004). It was designed to evoke frustration directed toward the mother. The child was seated at a table. The experimenter demonstrated how to play with an attractive toy (marbles) and encouraged the child to play with it for approximately 30 s before she left. The mother, as previously instructed by the experimenter, removed the toy, stating that she did not like it and did not want the child to play with it anymore. The mother kept the toy for about 30 s while maintaining a neutral attitude and did not give the toy back to the child even if the child requested it. After 30 s, the mother stated that she changed her mind, returned the toy to the child, and let the child play with it. If at any time during TR, the child reached maximum distress (non-muted and full intensity crying for 20 s) or if the mother requested, the episode would be terminated so that the child could be comforted by the mother.

Emotion coding and reduction during TR. Children's facial expressions (anger, sadness, and happiness) were coded based on the prototypes of specific emotions in the facial action coding system (Ekman, Friesen, & Hager, 2002). There are several prototypes and variants of facial anger expression, and the main action units of anger were brow lower (AU4), upper-lid raiser (AU5), lid tighten (AU7), lip tighten (AU23), or lips part (AU25)/jaw drop (AU26). As suggested by Ekman, only one facial region (such as a lower brow) may or may not reflect anger (Ekman et al., 2002). Therefore, anger was considered to be expressed if whole action units in one prototype or variant of anger emerged. It is important to note that facial anger was not scored if the child was crying or about to cry, because the cry or pre-cry mouth often resembles anger but might combine multiple negative affects such as anger, sadness, or global distress (Oster, 2005). The main action units of sadness were inner brow raiser (AU1), brow lower (AU4), nasolabial furrow deeper (AU11), and lip corner depressor (AU15), and the main units of happiness were cheek raiser (AU6) and lip corner puller (AU12). The TR period, which was from when the mother removed the toy to when she returned it to the child, was divided into ten 3 s epochs. The two coders, blind to the hypotheses of the study, were trained to assess whether the child expressed anger, sadness, or happiness within each epoch (presence of facial anger, sadness, or happiness) and to record the time when the child first expressed facial anger after the mother removed the toy (latency to facial anger). Both of the coders coded the same 25 percent of cases to obtain reliability. The Cohen's kappa reliability coefficients were .84 for facial anger, .66 for facial sadness, and .91 for facial happiness, and inter-rater agreement was .99 for latency to facial anger. As only a few children show facial sadness (4 out of 82) or happiness (7 out of 82) during TR, these affect measures were not included in any further analyses. In addition, there were three epochs of facial expressions that were not coded because the face was not visible. Then, a frequency of facial anger was computed across epochs.

Nonverbal behaviors indicative of anger, such as hit-mother and stamp/jump (Hubbard, 2001; Potegal & Davidson, 2003), were coded on an event basis in each of the 3 s coding intervals during TR. Inter-raters' Cohen's kappa coefficients were .89 for hit-mother and 1.00 for stamp/jump. The frequencies of hit-mother and stamp/jump were measured as averages across epochs.

Finally, the data were reduced to create an *anger expression composite*, which was computed as the average of standardized scores of latency to facial anger (reverse scored), frequency of facial anger, frequency of hit-mother, and frequency of stamp/jump (all of them were highly inter-correlated, $r_s > .28$, $p_s < .01$).

Persistence coding and reduction during TR. Children's persistence was examined by intense attempts to retrieve the toy from the mother (e.g., stretching arms to reach the toy or following the mother to pursue the toy) per epoch. Inter-raters' Cohen's kappa reliability coefficients was .84 for persistence. The frequency of persistence was then calculated as an average across epochs.

LB. To avoid the potential overlap issues of anger and persistence being assessed in the same task (TR), children's persistence was also assessed in another task involving the blockage of a highly desirable goal, the 'LB' modified from Lab-TAB (Goldsmith et al., 1994). The task began with a learning/practice period during which the experimenter taught the child to open the lock with a key. After successful practice, the experimenter showed the child a toy locked in a transparent box and then gave the child

the wrong key to open the box before leaving the room. (Note that no children realized that the key was wrong during the entire procedure.) The toy in the transparent box was packed nicely to attract the child. The mother completed questionnaires in the corner of the room and was informed in advance to avoid encouragement or help if the child asked. After 3 min, the experimenter returned and announced her mistake regarding the key. Then, she gave the child the correct key to open the box and allowed the child to play with the toy.

Persistence coding and reduction during LB. Children's persistence was measured as the total number of seconds spent trying to open the box using a variety of ways, including opening the box by himself or herself or seeking help from the mother or the experimenter (without getting real help or encouragement). Help seeking was defined as looking for the experimenter or making a statement about help toward the mother. As the child might seek comfort rather than help from the mother, only behaviors such as giving the key or box to the mother, or pulling the mother to the box (to open it), or clearly asking for help was considered as help seeking. Inter-rater reliability (intra-class correlations) on 25 percent of the cases was .95 for persistence in this task.

Previous studies have used this task to elicit frustration or anger in early childhood (Dennis et al., 2009). However, only 5 (out of 84) children expressed facial anger during this task in the current study, and these 5 angry children did not differ from non-angry children in persistence ($p = .55$). In addition, no other facial expression such as sadness or happiness was observed.

IPC. This task was also modified from the Lab-TAB (Goldsmith et al., 1994) to assess child persistence in response to adult demand in the face of negative feedback. The experimenter repeatedly asked the child to draw a 'perfect' circle and criticized every circle for its imperfections. The criticisms were specific but did not include information on how to rectify the problem, for example, 'That one is too thin'. The task lasted a maximum of 3.5 min. After the final circle, the experimenter told the child they had succeeded and rewarded the child. Unlike TR and LB, in which the child is motivated to get the attractive toy, in IPC, the goal to draw a perfect circle is set by the experimenter and arouses less approach motivation in the child (Dennis, Hong, & Solomon, 2010).

Persistence coding and reduction during IPC. Children's persistence was measured by the time (in seconds) spent engaging in the task. Inter-rater reliability (intra-class correlations) on 25 percent of the cases was .97 for persistence in this task. Similar to LB, neither anger nor other negative expressions were observed in this task.

Missing Data

For TR, 10 children were not scored: 6 children were too distressed and refused the task, 3 had equipment failures, and 1 mother could not get the toy away from the child. For LB, 8 children were not scored: 4 distressed children, 3 children failed in the key learning period, and 1 LB was broken by accident. For IPC, there were 4 children without score: 3 children quit before the task began and 1 had equipment failure. Comparisons between the children who were included vs. excluded from the analyses due to missing data did not indicate differences on any key variables (anger expression and persistence, $ps > .30$).

Results

Preliminary Analyses

All variables were normally distributed (skewness values ranged from $-.47$ to 1.85) and no data points were ≥ 2 *SD* above or below the mean. The descriptive statistics for the key variables are presented in Table 1. The sociodemographic variables, such as parents' education level, had no influence on the variables of anger expression and persistence ($ps > .45$).

T-test and Pearson-correlation analyses were used to examine the effects of age and gender on all variables in Table 1. We found no effects of either age ($p = .29$) or gender ($p = .23$) on anger expression during TR. However, boys exhibited more persistence during TR ($N = 38$, $M = .27$, $SD = .15$) than girls ($N = 44$, $M = .19$, $SD = .16$), $t(80) = 2.21$, $p < .05$.

Anger and Persistence

Is anger expression associated with enhanced persistence in the particular context of blockage of a highly desirable goal? To examine this question, the relationship between anger expression and persistence in pursuing highly desirable goals (getting the attractive toys) in TR and LB was explored first.

For TR, a hierarchical regression analysis was used to examine whether anger expression contributed unique variance in predicting persistence. Children's age and gender were entered in the first step of the regression. Anger expression was entered in the second step. As predicted, results indicated that anger expression was moderately positively associated with persistence, $\beta = .20$, $t = 1.85$, $p = .07$ (see Table 2).

However, anger expression and persistence might be linked because they were the main reactions during TR and might reflect some unique characteristics of that task. To rule out this competing hypothesis, we examined the anger–persistence relationship across different tasks, that is, anger expression in TR and persistence in LB. A hierarchical regression for persistence duration during LB as a dependent variable, with age, gender, and anger expression as predictors, suggested that anger expression during TR was positively related to persistence during LB, $\beta = .25$, $t = 2.19$, $p < .05$ (see Table 2).

The second question is whether an anger–persistence association exists when the goal is not highly desired, as in IPC. A hierarchical regression for the duration of persistence during IPC as a dependent variable, with age, gender, and anger expression

Table 1. Descriptive Statistics of the Key Variables

Variables	N	<i>M</i>	<i>SD</i>
Anger expression in TR	82	.00	.77
Frequency of persistence in TR	82	.23	.16
Duration of persistence in LB (seconds)	84	123.76	35.19
Duration of persistence in IPC (seconds)	88	40.44	24.79

Notes: TR = toy removal; LB = locked box; IPC = impossible perfect circles.

Table 2. Summary of Hierarchical Regressions for Variables Predicting Persistence

Variable	Persistence in TR (frequency)			Persistence in LB (duration in seconds)			Persistence in IPC (duration in seconds)		
	R^2	ΔR^2	$F\Delta$	R^2	ΔR^2	$F\Delta$	R^2	ΔR^2	$F\Delta$
Step 1: Age and gender	.06	.06	2.44	.03	.03	1.33	.04	.04	1.70
Step 2: Anger expression	.10	.04	3.24 ⁺	.09	.06	4.82*	.05	.01	.64

Notes: TR = toy removal; LB = locked box; IPC = impossible perfect circles.
⁺ $p < .10$, * $p < .05$.

during TR as predictors, revealed no significant effects (see Table 2), $ps > .43$. In addition, there was no correlation between persistence in TR, LB, and IPC, $ps > .54$, supporting their independence across different tasks.

Discussion

The aim of this study was to explore the relationship between anger expression and goal-directed persistence in challenging contexts in young children. Although anger is often thought of as a destructive reaction in response to frustration (Lemerise & Dodge, 1993), the current study found that anger expression in typically developing young children during a goal-blocked task (TR) was associated with the persistent pursuit of desirable goals, both within the task and in a different goal-blockage task (LB). Note that the child's persistence in getting the toy back from the mother during TR is an approach action to obtain results mediated by a specific social other (the mother). In other words, it could also be regarded as the child's noncompliance with the mother's requests. Actually, Lewis (2006) suggested that infants prone to anger displayed strong noncompliance with the mothers' requests and great determination to do what they want to do in early childhood. More importantly, in the present study, persistence was measured in a separate task not involving any mediation by social others or disobedience (LB); a strong positive relationship between anger during TR and persistence in trying to open the locked box was found, too. It is noteworthy that Chinese children seldom expressed anger and other negative emotions in LB. Thus, this result revealed a cross-situational consistency in the patterns of anger expression and persistence in pursuing highly desirable goals.

These results strongly support the functional theory of emotion (Campos et al., 1989). The adaptive functions of anger are to overcome obstacles, attain difficult goals, and regain control. The findings extend the positive link between anger expression and persistence in adults and children. In previous studies, greater anger accounted for adults' high, persistent focus on outcomes during goal blockage (Lench & Levine, 2008), whereas anger-prone infants showed more instrumental behaviors (arm pulling) than average infants when blocked during a contingency learning task (Lewis & Ramsay, 2005; Lewis et al., 1992, 2006). Moreover, in a recent study using the same task (LB) in young children, anger, compared with sadness, was more often followed by problem-solving behaviors; angry children tried more ways to open the transparent box (Dennis et al., 2009). This finding fits with the notion that anger is an arousing and activating emotion (Lang, 1995) that is linked to persistence.

Findings also suggested that anger is related to the motivational tendency to approach blocked goals (Carver & Harmon-Jones, 2009). Thus, angry children were able to harness the goal-induced approach motivation to maintain appropriate, task-focused persistence. However, when the children kept drawing circles at the experimenter's request, not of their own will, the goal was not so desirable and the children were not fully engaged. Then, anger expression was not associated with great persistence. Furthermore, previous findings suggest that when persistence is confounded with the regulation of approach motivation (e.g., doing puzzles without cheating), anger-prone children were more likely to cheat (look at the solution) and not exhibit persistence (Eisenberg et al., 2004). Therefore, individual degrees of approach motivation could influence the relations between anger and persistence; further studies should clarify this association.

The current study demonstrated the adaptive function of anger in that anger expression was positively associated with persistence in the pursuit of blocked but highly desirable goals. However, if the goal was unattainable, or if the task was unsolvable, it may lead to helplessness and depression, which were not followed by great persistence in the subsequent solvable task (Mikulincer, 1988). Moreover, children reported anger when they perceived that they could change undesirable results and reinstate their goals (Levine, 1995). Similarly, in the present study, children had learned to use a key in advance and none of them realized they had been given the wrong key. Hence, children who expressed anger during obstacles seemed to believe that the goal was attainable and made a great effort to open the box. However, another study revealed that people who felt angry attended longer in unsolvable anagrams and had more difficulty diverting attention to further tasks compared with non-angry people (Lench & Levine, 2008). As participants in Lench and Levine's study were only informed that the tasks were independent from each other, it was likely that the angry participants did not realize the unattainability of the goal and thus spent time trying to solve the unsolvable anagrams. Therefore, the perceived control to change the aversive situations and attain the goals might be responsible for the association between anger expression and persistence; more research is needed to confirm this assumption.

Limitations and Future Directions

Limitations of the current study include the following: firstly, anger expression was only assessed in one task (TR). Current results may be specific to this situation of a certain level of frustration. Although the relation between the temporary state of anger expression and persistence was explored in both the same and different tasks, it would be preferable to examine the individual differences of anger disposition across several frustrating tasks and parental reports, and their connection to persistence across various tasks with varying goals. Secondly, the current investigation confirmed the strong correlation of children's anger expression and persistence in goal-blocked contexts with highly desirable goals (TR and LB), but not in the challenging context with a less desirable goal (IPC). Nonetheless, variability among the different tasks themselves cannot be ruled out. Thus, how anger is related to persistence with various levels of engagement in the same task is an issue that needs further experimental consideration.

Conclusions

This investigation extended previous research by focusing on anger's beneficial function for persistence at goal-attainment efforts. This study is also among the first to explore the relationship between anger expression and persistence during goal blockage in young Chinese children. Such findings have implications for understanding the role of anger in adjustment and maladjustment and could inform the development of interventions for problems of persistence and behavioral regulation related to anger.

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