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Negative Feelings Exacerbate Hostile Attributions of Intent in Highly Aggressive Boys

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Tested the hypothesis that aggressive boys' tendency to attribute hostile intentions to peers is exacerbated in a negative emotional state. Twenty-nine highly aggressive boys in special education, 12 moderately aggressive boys in regular education, and 16 nonaggressive boys in regular education inferred peers' intentions in 8 vignettes concerning ambiguous provocation by peers. Mild negative emotions were induced by unjust loss of a manipulated computer game. Half the vignettes were completed in this negative emotional state. After completion of all vignettes, the game was played again and won to reinduce positive feelings. Self-ratings of feelings obtained throughout the study showed the manipulations consecutively induced negative and positive feelings. Negative feelings increased hostile attribution of intent in the highly aggressive group. Highly and moderately aggressive boys responded more aggressively than nonaggressive boys.

Aggressive behavior problems are associated with rejection by peers, domestic conflict, and a life history of aversive experiences (Coie & Dodge, 1998; Dishion, French, & Patterson, 1995). Consequently, boys with aggressive behavior problems experience negative emotions more frequently than their peers. These frequent and intense negative feelings are not only disconcerting; they may also impair these boys' social functioning.

According to Dodge (1985), a negative emotional state makes aggressive boys more prone to attribute hostile intentions to other children they interact with, thereby making aggressive boys behave more aggressively than they would in a neutral emotional state. Dodge hypothesized that aggressive children may have been classically conditioned by frequent experiences of co-occurring negative feelings and hostility from others. Being so conditioned, negative feelings may trigger an expectation of oncoming hostile, threatening behavior from others. This hypothesis seems plausible, given the fact that many children with aggressive behavior problems have histories of abuse, neglect, and rejection (Coie & Dodge, 1998) and exhibit a tendency to attribute hostile intentions to peers in ambiguous situations (Orobio de Castro, Veerman, Koops, Bosch, & Monshouwer, 2002). Yet no study has directly tested whether negative feelings do actually increase aggressive boys' tendency to attribute hostile intentions.

To illustrate the hypothesized effect of negative feelings on attribution of intent in aggressive boys, reviews (see, for example, Coie & Dodge, 1998; Crick & Dodge, 1994; Dodge, 1993) generally refer to a study by Dodge and Somberg (1987). In this study, groups of aggressive–rejected and nonaggressive–popular boys individually rated the intentions of peers in hypothetical situations before and after a threat manipulation. This threat manipulation was conducted by the experimenter. Halfway through the experiment, the experimenter explained he was going to get another boy who would join them and left the room. Through an intercom, the participant then overheard the experimenter argue with the boy who was to join them. This boy told

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the experimenter that he did not like the participant and would get into a fight with him. In reality—but unknown to the participant—there was no other boy, just an audiotape that was played through the intercom system to make participants feel threatened. After this threat manipulation, participants completed the intention ratings. The threat manipulation in this study had an effect on attribution of intent. There was no difference between groups in attribution of hostile intent before the threat manipulation, whereas after the manipulation the aggressive–rejected group attributed more hostile intentions than the nonaggressive group.

Dodge and Somberg's (1987) study provided evidence of an effect of threats by a peer on attribution of intent. It did not, however, provide unambiguous evidence for a causal role of negative emotions in exacerbating hostile attributions of intent in aggressive boys, for two reasons. First, the manipulation of emotion by means of threats from a peer did not only invoke negative emotions but also alerted participants to the fact that other boys may actually act with hostile intent. Thus, the effect of the manipulation may not have been caused by induction of negative feelings but because representations of hostile intent became more accessible in memory. Possibly participants were reminded that hostile behaviors by peers do occur in reality and were therefore more likely to presume hostile intent in the vignettes they rated after the threat manipulation. The plausibility of this alternative explanation of Dodge and Somberg's findings is underscored by two studies concerning the effects of priming on hostile attribution of intent. Kirsh (1998) demonstrated an increase in hostile attributions of intent in boys directly after playing violent video games. Graham and Hudley (1994) asked participants to complete tasks similar to those used in the Dodge and Somberg study. However, just before participants started the attribution of intent tasks, they were asked to memorize sentences describing social provocations with clearly hostile or clearly benign intent. Priming with hostile intent resulted in a marked increase in hostile attribution by the nonaggressive participants. This result led Graham and Hudley to plead for disentangling the effects of priming from the effects of emotions by using "variables that are affectively negatively toned (e.g., potentially evoking negative evaluations) but unrelated to the primed construct" (p. 371). Their suggestion is followed in this study.

Second, the relevance of the Dodge and Somberg (1987) study to aggressive behavior is hard to assess, because they used a combined selection criterion of aggressiveness and rejection by peers. That is, boys were selected on the basis of combined aggressiveness and rejection ratings. Even though aggressive behavior is strongly associated with rejection by peers, the two constructs are not identical. Both rejected nonaggressive boys and popular aggressive boys exist and show different social information processing (SIP) patterns (Asarnow & Callan, 1985; Sutton, Smith, & Swettenham, 1999; Waldman, 1996). Due to the simultaneous selection on rejection and aggressiveness, it is impossible to determine whether group differences in attribution of intent were due to aggressiveness or rejection. Rejected boys, by definition, have more personal experience with other peers' hostile intentions toward them than other boys. Therefore, hostile attributions may be more easily primed, or even be "chronically accessible" (Graham & Hudley, 1994) in rejected boys. Thus, the effect found in the Dodge and Somberg study may actually be an increased effect of priming in rejected boys, rather than an effect of emotion in aggressive boys.

In sum, the Dodge and Somberg (1987) study showed an intriguing pattern of findings that could be clarified by disconfounding negative emotion from priming and aggression from rejection. As far as we know, the hypothesis that negative emotion *by itself* causes more hostile attribution of intent in aggressive boys has not been tested to date.

The aim of this study was to assess whether boys with aggressive behavior problems do attribute more hostile intentions to peers when they are in a negative emotional state. To induce negative emotion without priming social expectations, we induced negative feelings through an event that was not associated with hostile social interaction. To this end, we experimentally manipulated participants' performance in a computer game. To disentangle aggressive behavior and rejection, participants were selected purely on (absence of) aggressive behavior, and social problems were statistically controlled for when necessary. Clinical relevance of the study was maximized by including participants with severe aggressive behavior problems in special education for hard-to-manage children.

A secondary aim of the study was to test whether the expected increases in hostile attribution were associated with increases in aggressiveness of responses to hypothetical vignettes concerning social conflicts. According to SIP models (Crick & Dodge, 1994; Dodge, 1985), aggressiveness of responses to provocative social interactions with peers depends on attribution of intent to these peers. Numerous studies have demonstrated a relation between attribution of intent and aggressiveness of responses to ambiguous provocation vignettes (e.g., Dodge, Pettit, McClaskey, & Brown, 1986). If this relation is indeed causal, an increase in hostile attribution of intent caused by a negative emotional state should in turn cause an increase in aggressive responses to such vignettes.

Method

Design

Three groups of boys with different degrees of aggressive behavior problems participated in the study.

The highly aggressive group (HIGH) consisted of boys referred to special education for aggressive behavior problems. The moderately aggressive group (MODERATE) consisted of boys in regular education with aggressive behavior problems. The nonaggressive group (NON) consisted of boys in regular education with virtually no aggressive behavior problems. Each participant completed two conditions: a neutral-emotion condition prior to emotion manipulation and a negative-emotion condition following emotion manipulation. Thus, the experimental design consisted of aggressive behavior problems as between-participants factor with three levels (HIGH / MODERATE / NON), and emotion as within-participants factor with two levels (neutral / negative).

Participants

Fifty-seven boys ages 9 to 13 participated in the study. The highly aggressive group (HIGH) consisted of 29 boys referred to special education for aggressive behavior problems. In the Netherlands, children are only referred to this type of education if the severity of their behavior problems significantly impairs social functioning and prohibits participation in regular education, according to parents, teachers, and diagnosticians. Informed consent was obtained from all participants and their parents. The moderately aggressive group (MODERATE) consisted of 12 boys in regular education with teacher-rated externalizing behavior problems scores on the Teacher's Report Form (TRF; Achenbach, 1991; see Measures section) in the borderline or clinical range. The nonaggressive group (NON) consisted of 16 boys from the same classrooms as the MODERATE participants with TRF externalizing problems scores below the Dutch mean. Groups did not differ in mean age (overall M = 11 years, SD = 1.2 year).

Instruments

Behavior problems. Teachers filled out the Dutch version of the TRF (Achenbach, 1991; for the Dutch version, see Verhulst, van der Ende, & Koot, 1997). The TRF contains 118 multiple-choice behavior items and 2 open-answer questions. For each multiple-choice item, teachers indicate 0 if the problem statement is not true for the child, 1 if somewhat true, and 2 if very often true. Achenbach reported high 15-day test–retest reliability, 2-month stability, and validity for this instrument. TRF items can be grouped into various scales. In this study we used the externalizing problems, aggressive behavior, and social problems scales. Norms for Dutch children published by Verhulst et al. (1997) were used to calculate normative T scores. T scores of 63 or higher, corresponding to the 90th percentile (the so-called borderline and clinical ranges) on the externalizing problems scale were used as minimum cutoff score for the MODERATE group. T scores of 50 or less on the same scale, corresponding to the 50th percentile, were used as maximum cutoff for participation in the NON group.

Social Information Processing. Two parallel sets of four audiotaped vignettes each (Orobio de Castro, 2000) were presented to participants in random order. All vignettes concerned being hindered by a peer whose intentions are ambiguous. This context is the most important source of social conflict at school for this population (Cuperus, 1997; Dodge, McClaskey, & Feldman, 1985). To obtain relevant and ambiguous vignettes, observations of boys at a psychiatric institution and consultation with staff were used to provide story themes. The vignettes obtained from these story themes were then tested in a pilot study with 15 boys in the psychiatric clinic and 20 boys from regular schools near the clinic. Only vignettes familiar to participants, invoking self-reported negative affect and with sufficiently ambiguous representation of intent scores, were used in this study, as illustrated by this sample vignette:

> Imagine: You and a boy in your class are taking turns at a computer game. Now it's your turn, and you are doing great. You are reaching the highest level, but you only have one life left. You never came this far before, so you are trying very hard. The boy you are playing with watches the game over your shoulder. He sees how far you have come. Then he shouts "Watch out! You got to be fast now!" and he pushes a button. But it was the wrong button, and now you have lost the game!

To assess SIP, participants were asked three questions directly after listening to each vignette. First, they were asked why the provocateur in the vignette acted the way he did. Second, they were asked to specify their answer on a 10-point rating scale ranging from 1 (*to be nice*) to 10 (*to be mean*). Third, participants were asked to tell how they would respond if they would actually experience the events in the vignette.

Hostile attribution of intent was assessed with the first two questions. Answers to the open-answer question concerning the peer's intention were coded as *benign* (e.g., "he tried to help"); *accidental* ("he didn't mean to do it"); *ambiguous* (e.g., "maybe on purpose, maybe not, it doesn't say, does it?"); or *hostile* (e.g., "he wants to make me lose"). By counting the number of vignettes in each condition with a "hostile" answer to this question, a hostile attribution score was calculated with a minimum of 0 (*no hostile answer given*) and a maximum of 4 (*hostile answers given for each vignette in the condition*). To assess interrater reliabilities for the coding of answers to the hostile attribution questions, transcriptions of 30 randomly selected boys' answers were coded independently by a second rater. Interrater agreement was 94%, and Cohen's kappa was .91.

Ratings on the 10-point attribution rating, scales were averaged over vignettes for each condition. Next, aggregate pre- and postmanipulation hostile attribution variables were constructed. To this end, the open-answer and rating-scale attribution variables were standardized with the premanipulation means and standard deviations and then averaged. Cronbach's α for the aggregate attribution variable was .79.

Response aggressiveness was assessed with the third question. A response aggressiveness score was calculated for each vignette by coding each response as *physical aggression* (e.g., "punch him in the face"); *destructive aggression* (e.g., "break his game boy"); *verbal aggression* (e.g., "call him dumbo"); *coercion* (comprising direct action, threats, and commands; e.g., "if you don't fix it, I'll beat you up"); *solution attempt* (e.g., "Shall I play again cause it wasn't my fault?"); or *avoidance* (e.g., "I'd just go away, and if he asked where I went I'd say 'to play somewhere else'"). Interrater agreement for these codes was 88%, with a Cohen's kappa of .74.

In a previous study (see Orobio de Castro, 2000), referred aggressive and normal comparison boys rated aggressiveness of the coded behavior categories. Findings showed that, by weighting physical and destructive aggression with 2 points, verbal aggression and coercion with 1 point, and solution attempts and avoidance with zero points, an interval scale of response aggressiveness could be created that matched the aggressiveness ratings by boys in regular and special education closely. This procedure was also used in this study. Responses to each vignette were first coded separately. Mean response aggressiveness scores were then calculated by averaging over the four vignettes in each condition. Thus, we constructed response aggressiveness variables with a minimum of zero (solution attempts or avoidance in all vignettes) and a maximum of 2 (physical or destructive aggression in all vignettes). Cronbach's α for response aggressiveness was .69.

Mood-o-meters. Participants' feelings during the experiment were assessed by means of "mood-o-meters" for anger, sadness, and happiness. These are 10-point rating scales in the shape of thermometers with a facial expression of the concerning emotion depicted above the scale.

Computer game "Hunchback." A manipulated computer game was used to induce negative and positive feelings in participants during the experiment. To this end, we adapted the computer game "Hunchback of Notre Dame." R. Schmidt (Fireball Software, ltd., Norway) kindly made the Pascal source code for the original game publicly available on the Internet. "Hunchback" is a game for one player, who plays the part of Quasimodo. To score points and win the game, Quasimodo has to walk over a castle wall, climb a tower, and free princess Esmeralda, who is imprisoned there. Walking over the castle wall (see Figure 1), Quasimodo is hindered by pitfalls, arrows, and can-

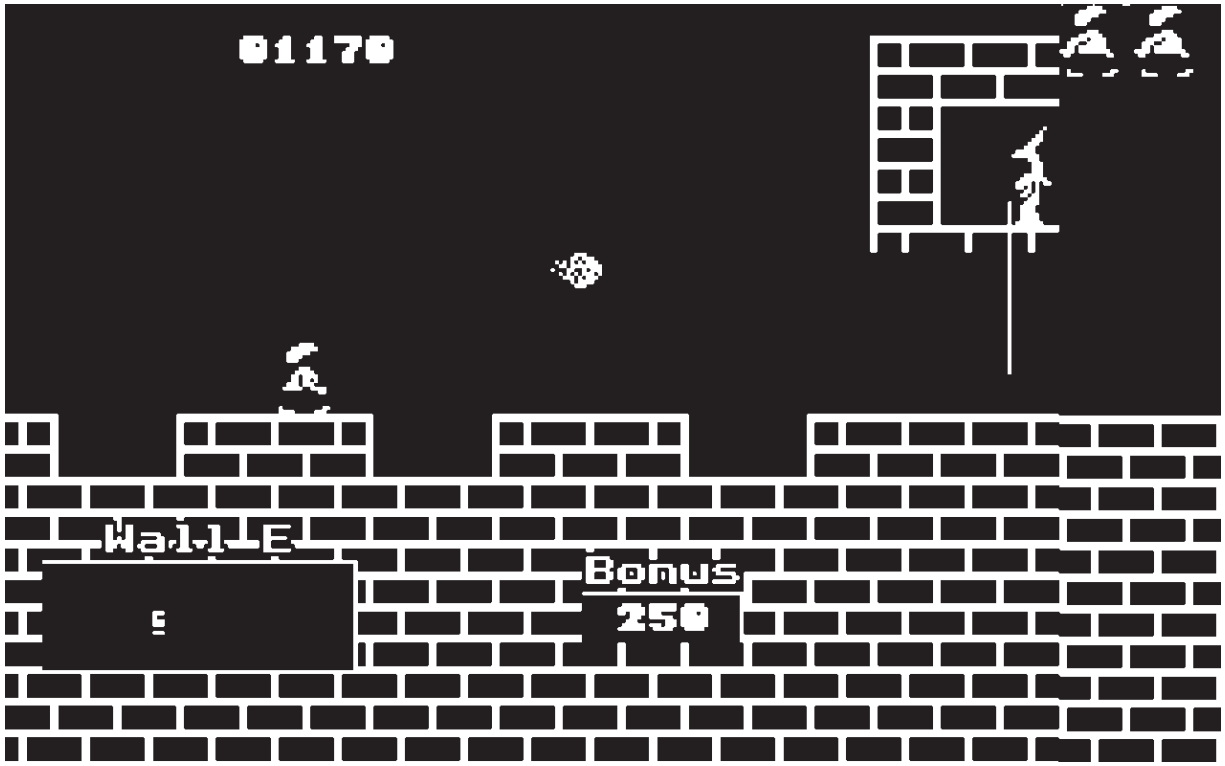

Figure 1. Scene from computer game "Hunchback of Notre Dame" used to induce negative emotions.

nonballs. He has to avoid these obstacles by jumping over them, or by not jumping into them while they fly over his head. Compared to most contemporary computer games, "Hunchback" is a simple and straightforward game. It requires the use of only two keys: the right-shift key to walk and the space key to jump. Aim and operation of the game were clear to all participants.

At the start of the game, the following instruction was shown on screen and read aloud by the experimenter:

> In this game you are Quasimodo. Quasimodo wants to walk over the castle wall toward the tower, where the beautiful princess Esmeralda is imprisoned. To reach her you have to pass obstacles and ring the tower bells. Watch out for arrows, cannonballs, and pitfalls … Use your left- and right-shift keys to walk, and the space bar to jump.
>
> —DO NOT PRESS ESCAPE, BECAUSE IT ENDS THE GAME—

Shift and space keys were marked with colored stickers and pointed out by the experimenter.

At the start of each game, each player possessed three "lives." If he was hit by an obstacle or fell into a pit, one life was lost, and the game continued at the same level. To reach Esmeralda, participants had to complete five levels: two levels with approaching obstacles, two levels with pits, and one level with both pits and obstacles, respectively. On completion of the fifth level, Esmeralda appeared in her tower, surrounded by hearts, and music sounded.

To ensure the game was equally difficult for all participants, we altered the game to automatically adapt to each player's skill. The game slowed down every time a life was lost and became faster every time a level was completed. Thus, the speed of the game adapted itself to each player's skill.

For this experiment, we made three versions of the game: a practice version, a lose version, and a win version. The practice version was not manipulated but merely altered to adapt to each player's skill, as described previously. The lose version was manipulated to ensure that each player would reach the last part of the highest level by supplying him with a new "bonus" life if only one life was left. However, when the player reached the last part of the highest level, a noise sounded, the game stopped, and the message "*Game over. Escape pressed*" appeared. If any button was pressed thereafter, the game disappeared, and the seemingly official error message "*Escape pressed. Hunchback stopped, exit no. 457-30-521A*" was shown.

By making the player unjustly lose the game moments before winning, we aimed to induce negative emotions. We made a computer error the cause for losing the game to ensure that the player could not attribute the induction of negative feelings to social causes (like a peer or the experimenter) or his own fault. The escape key was too far away from the game keys on the keyboard for the participant to have accidentally hit the key.

The win version of the game was again manipulated, but this time to ensure that players could only win the game. As in the lose version, participants always gained a new life if they only had a single life left. This version allowed participants to complete the entire game, free Esmeralda, and win a prize.

Procedure

Participants were individually tested in a quiet room at their school. In a standardized instruction, participants were told they were going to listen to stories concerning events they could experience any day and would be asked what they would do if they actually experienced the stories. Participants were asked to imagine they experienced the stories themselves. It was emphasized that no wrong answers could be given, and participants were assured of the confidentiality of their answers. Next, the experimenter referred to a personal computer at a table in the same room, some distance away from the table where participant and experimenter were seated, and promised the participant he would be allowed to play a computer game during a break in the interview.

Each boy participated in both the neutral emotion and the negative-emotion condition, respectively. Each condition consisted of four vignettes with the concomitant questions (see Measures section). In the neutral condition, emotion was not manipulated. Participants were merely asked to indicate their current feelings on the mood-o-meters for anger, sadness, and happiness and then proceeded to answer questions about a set of four vignettes.

After completion of the neutral condition, participants were given a break to play the promised computer game. In fact, this break served as the start of the negative-emotion condition. Unknown to participants, the break was used to induce negative feelings, as follows. First, the experimenter explained the game, and the participant played the practice version of the game (see Measures section). Once the participant understood the game and finished a game, the experimenter told the participant that she was actually doing a little competition on this game and that the participant could win one of several prizes if he would complete the next game successfully. She then showed the participant three different small prizes and asked the participant which prize he would like to win (thus, we aimed to increase the participant's commitment to winning the game). After the participant chose his favorite prize, the game was started. However, this time the experimenter unobtrusively started the lose version of the game. While the participant played the game, the experimenter went back to the interview table, where she started to arrange her papers. When the participant in-

Table 1. *Emotion Ratings by Group and Condition*

		Condition					
		Neutral		Negative		After	
Group	**Emotion**	***M***	***SD***	***M***	***SD***	***M***	***SD***
Nonaggressive	Anger	.13	.50	3.44	2.76	.81	2.01
	Sadness	.25	1.00	1.25	1.61	1.00	2.16
	Happiness	6.00	1.41	3.06	2.57	4.44	2.80
Moderate	Anger	.67	1.56	3.58	2.87	1.08	1.56
	Sadness	.83	1.34	2.17	2.59	.75	1.06
	Happiness	5.58	1.44	1.92	1.93	4.17	2.72
High	Anger	.55	1.97	3.48	3.41	.03	.19
	Sadness	.55	1.30	1.62	3.09	.07	.26
	Happiness	7.41	2.95	2.72	3.30	9.45	1.38

evitably lost the game, the experimenter went to see what happened. As she could not have seen why the participant lost the game from the interview table where she was seated, she told the participant that it was too bad he lost but that she could not help it and that he could not play again. She then told the participant they were going to continue the interview, and—without further discussion about the game—proceeded to interview the participant about the second set of four vignettes.

When the negative-emotion condition was completed, the experimenter told the participant that he had done so well that she would let him play the game again. This time, she secretly started the win version of the game. Therefore, after an adventurous trip through all levels of the game, the participant won the game and his favored prize. The participant was then asked to fill out the mood-o-meters for how he felt when he had just lost the game. Finally, he was asked to fill out yet another set of mood-o-meters for how he currently felt, was thanked for his cooperation, and was asked not to tell other boys about the interview.

Results

Behavior Problems

Behavior problems were assessed with the TRF. Linear contrasts were specified in ANOVA to test the expected group differences on TRF scores for aggressiveness and externalizing behavior problems. Groups differed in a linear fashion on TRF scores for aggressive behavior, $F(2, 55) = 36.47$, $p < .000$, and externalizing problems, $F(2, 55) = 79.66$, $p < .000$. Post hoc group comparisons by means of Tukey's HSD confirmed that mean T scores for aggressive behavior were highest for the highly aggressive group ($M = 73.9$, $SD = 9.9$), lower for the moderately aggressive group ($M = 66.2$, $SD = 10.8$), and lowest for the nonaggressive group ($M = 50.2$, $SD = .4$), $p = .022$ and $p < .000$, respectively. Mean T scores for externalizing problems were also higher for the highly ($M = 71.3$, $SD = 7.0$) than for the moderately ($M = 64.5$, $SD = 9.3$) aggressive group, that in turn received higher scores than the nonaggressive group ($M = 42.8$, $SD = 4.5$), ps .012 and .001, respectively.

Groups also differed on teacher-rated social problems, $F(2, 55) = 6.56$, $p = .003$. Social problems T-scores were higher in the highly ($M = 64.7$, $SD = 7.7$) and moderately ($M = 62.8$, $SD = 10.7$) aggressive groups than in the nonaggressive group ($M = 53.6$, $SD = 6.8$) , ps $< .01$. The moderately and highly aggressive group did not differ in social problems, $p = .75$. Aggressive and externalizing behavior problems were related to social problems, with rs of .32, ps $< .02$. However, social problems were not related to any dependent variable, neither before nor after the manipulation. Therefore social problems were not controlled for in further analyses.

Affect Manipulation

Table 1 shows mean mood-o-meter ratings of anger, sadness, and happiness in the neutral condition, in the negative-emotion condition, and at the end of the experiment. To check whether the affect manipulation equally induced negative feelings in all groups, mood-o-meter scores for anger, sadness, and happiness were used as dependent variables in three 3 × 2 analyses of variance with Group (NON/MODERATE/HIGH) as a between-participants factor and Condition (neutral/negative) as a within-participants factor. After losing the game, participants in all groups became more angry, $F(2, 54) = 37.95$, $p < .001$, d[1] = 1.91; more sad, $F(2, 54) = 10.36$, $p = .002$, $d = .81$; and less happy, $F(2, 54) = 66.34$, $p < .001$, $d = 1.65$.

[1]For between-participants comparisons, effect size d is the difference between group means, expressed in standard deviations of the nonaggressive group. For within-participants comparisons, effect size d is the difference between means expressed in premanipulation standard deviations.

There was no main effect of, or interaction with, group status, which indicates that emotional state and the amount of negative emotion induced by the manipulation were comparable across the three groups. Emotional state after participation in the experiment did not differ from emotional state prior to participation.

Hostile Attribution of Intent and Response Aggressiveness

Tables 2 and 3 display mean hostile attribution of intent and response aggressiveness scores in the neutral and negative condition by the groups of nonaggressive, moderately aggressive, and highly aggressive boys. The effects of the negative emotion induction on hostile attribution and response aggressiveness were tested in two 3 × 2 univariate analyses of variance with group as between-participants factor and condition as within-participants factor.

For hostile attribution of intent, a significant Group × Condition interaction was found, $F(2, 55) = 3.18$, $p = .049$; see Table 2. No premanipulation group effect was found, whereas following the affect manipulation, the two aggressive groups combined made more hostile attributions than the nonaggressive group, $F(1, 56) = 2,91$, $p = .047$, $d = .42$. There was no condition main effect. Pairwise comparisons indicated that the negative emotion induction increased hostile attribution of intent only in the highly aggressive group, $p = .020$, $d = .46$.

For response aggressiveness, a group main effect was found, $F(2, 55) = 8.82$, $p = .000$; see Table 4. Post hoc analyses with Tukey's honestly significant difference procedure showed that the moderately and highly aggressive groups responded more aggressively than the nonaggressive group, whereas the two aggressive groups did not differ in response aggressiveness. There was no main effect of condition on response aggressiveness, nor was there a Group × Condition interaction, $F(2, 54) = 1.46$, $p = .241$.

Thus, the mean increase in hostile attributions in the highly aggressive group was not accompanied by an increase in response aggressiveness. Exploratory analyses revealed this nonfinding may be due to a ceiling effect on response aggressiveness for some highly aggressive boys. The increase in hostile attribution scores following the induction of negative feelings was not accompanied by an increase in response aggressiveness in 10 of the highly aggressive boys. Interestingly, these 10 boys already responded significantly more aggressively ($M = 1.55$, $SD = .35$) than the other highly aggressive boys ($M = .91$, $SD = .52$) *before* negative feelings were induced, $t(1, 27) = 3.43$, $p = .002$, $d = 1.23$. Recall that the maximum response aggressiveness score possible was 2, if all responses concerned physical or destructive aggression. For these boys, the high mean score of 1.55 before the effect manipulation suggests that a ceiling effect made a further increase in response aggressiveness due to the affect manipulation unlikely. An increase in response aggressiveness due to the affect manipulation was, however, possible for highly aggressive boys with low premanipulation response aggressiveness scores. An exploratory analysis of the effect of condition on response aggressiveness including only the nine highly aggressive boys with premanipulation response aggressiveness scores below 1 did reveal a significant increase in response aggressiveness due to the affect manipulation (premanipulation $M = .44$, $SD = .30$; postmanipulation $M = .72$, $SD = .36$), $t(1, 8) = 2.86$, $p = .011$, $d = .75$. Note, however, that the 9 boys with low premanipulation scores included in this exploratory analysis are—by definition—an unrepresentative subset of the highly aggressive group and that the increase in response aggressiveness in this subgroup may be due to regression to the mean. Results of this exploratory analysis should therefore be interpreted with care.

Table 2. *Hostile Attribution of Intent by Group and Condition*

	Group					
	High		Moderate		Non	
Condition	*M*	*SD*	*M*	*SD*	*M*	*SD*
Neutral	–.19[a]	.91	.15	.89	.15	1.10
Negative	.23[ab]	1.25	.35[c]	.94[bc]	–.21	1.12

Table 3. *Response Aggressiveness by Group and Condition*

	Group					
	High		Moderate		Non	
Condition	*M*	*SD*	*M*	*SD*	*M*	*SD*
Neutral	1.12[a]	.57	1.02[b]	.52	.52[ab]	.34
Negative	.93[c]	.52	1.08[d]	.48	.47[cd]	.40

Note: Means with the same subscript are significantly different at $p < .05$.

Discussion

The main aim of this study was to test whether the tendency of boys with aggressive behavior problems to attribute hostile intent is exacerbated by negative emotions. Highly aggressive boys did indeed attribute more hostile intent in a negative affective state, whereas moderately and nonaggressive boys did not. This is the first study to show that this effect occurs even when negative emotion is induced without priming of negative intentions. Moreover, the effect occurred even though only a modest degree of self-reported negative

emotions was evoked in the participants and while the negative affective state may not have lasted throughout the entire negative-emotion condition.

The manipulated computer game proved an effective experimental manipulation. Participants' emotional states were adequately influenced from neutral to negative and back to neutral. This experimental manipulation has several advantages over other procedures to influence children's emotional state, such as imagining emotional events, priming of emotional words or pictures, or manipulated social interactions. The manipulation used in this study does not depend on children's willingness or ability to imagine or self-induce emotions, which may be particularly problematic with clinically aggressive, hyperactive, or depressed children. Furthermore, the procedure is standardized and automatically adapts to children's skills at the game, resulting in comparable changes in emotional state for all participants. This is an important advantage over procedures that include standardized stimuli that may not be equally relevant to all participants and over procedures that require participants to recall idiosyncratic emotional events that may differ in tone and severity among participants. Finally, because the procedure does not involve priming or presentation of stimuli related to the variables under study, effects of the manipulation can be ascribed entirely to changes in emotional state.

Before conducting this study, the ethical implications of deliberately inducing negative feelings in boys were concisely discussed with teachers working in regular and special education, psychologists, psychiatrists, and research staff. All people consulted agreed it would be ethically permissible to manipulate emotions by loss of a computer game due to a computer error, for several reasons. First, losing a computer game (and thereby not obtaining tangible rewards such as being allowed to play again) is a stressful event that frequently occurs to boys of this age anyway. Therefore, losing the game in our experiment did not place an excessive additional burden on the boys. Second, we minimized chances of boys blaming themselves for losing the game by making losing the game the computer's fault. Third, we avoided unjust treatment of the child by the experimenter that might have led the child to attribute hostile intentions or carelessness to the experimenter (or to adults in general), by making clear to the child that, from her location, the experimenter could not have seen whether the child pressed the escape key or not and by the experimenter's empathic reaction to the child losing the game. Finally, by letting each participant win the game and the prize at the end of the experiment, we aimed to let participants experience the feeling that they were able to play well, to alleviate negative feelings, and to end their participation positively. Induction of stronger negative emotions—comparable to real-life stresses—would allow for an even more valid test of the influence of negative emotions on attribution of intent and aggressiveness. We would, however, consider induction of more than mildly negative feelings for research purposes unethical.

Throughout the experiment, both aggressive groups responded more aggressively to hypothetical vignettes than the nonaggressive comparison group. The relevance of the finding that negative emotions lead highly aggressive boys to make more hostile attributions of intent lies partly in the proposed relation with aggressive responses. Unfortunately, the relation between increases in hostile attributions and increases in response aggressiveness could not be tested for all highly aggressive boys, because of a ceiling effect on response aggressiveness. For the subgroup of highly aggressive boys with low premanipulation response aggressiveness scores, mean response aggressiveness did increase following the affect manipulation. To unequivocally establish whether the effect of the manipulation on response aggressiveness was mediated by the increases in negative affect and hostile attribution of intent would require a mediation analysis. However, the number of boys in this subgroup was too small to conduct such an analysis. Therefore, it remains unclear whether the induction of negative affect directly causes more aggressive responses or does so indirectly, by causing more hostile attributions of intent that in turn influence response aggressiveness.

Surprisingly, before the affect manipulation, moderately and highly aggressive boys did not attribute more hostile intent than nonaggressive boys. This finding is inconsistent with findings in other studies concerning hostile attribution of intent in comparable samples with comparable instruments. A recent meta-analytic review (Orobio de Castro et al., 2002) demonstrated a robust significant relation between hostile attribution of intent and aggressive behavior in studies comparing referred to nonreferred samples using ambiguous provocation vignettes. It is not at all clear why this relation was not found in this study. We exploratorily tested for any relation between attribution of intent and participant characteristics other than aggressive behavior but found none. The previously mentioned review did show that considerable unexplained variance in study outcomes remained after accounting for known differences between studies in methods and participant characteristics. It appears that the hostile attribution effect only occurs with certain combinations of measures and participants that we do not yet fully understand. For example, participants with similar aggression scores in seemingly comparable studies may differ in kind of aggressive behaviors, circumstances under which these behaviors occur, or—more pertinent to our findings—their emotional state while participating. Further studies of hostile attribution of intent under different conditions, with dif-

ferent measures, and in different populations are required to resolve this issue.

An important limitation of this study is the small sample size. Unfortunately, inclusion of larger samples was not feasible for a first trial with a new and fairly taxing experimental manipulation in a clinical group. For the within-participants tests of the experimental effect, group sizes were acceptable. However, for between-participants tests, the resulting low statistical power was only sufficient to detect large effects. Small to moderate group differences may therefore not have been detected. Additional studies involving larger samples are needed to replicate these findings. For analyses within the highly aggressive group, the power problem was aggravated by the ceiling effect for response aggressiveness. Even though our coding system accommodated highly aggressive responses, such as hitting, kicking, and breaking other children's possessions, a large proportion of highly aggressive boys consistently responded in these most severe categories, even before the affect manipulation. Future studies may need to devise scoring systems that allow for distinctions in severity of more serious kinds of aggressive responses to prevent ceiling effects.

In past years, research on SIP, emotion, and aggression has helped improve assessment and treatment of aggressive behavior problems (e.g., Hudley & Graham, 1993; Lochman & Lenhart, 1993). We hope this study contributes to further improvements in several ways. Concerning assessment, findings clearly show that hostile attribution tendencies in highly aggressive boys are particularly evident in a negative emotional state. Therefore, diagnostic assessment of highly aggressive boys' SIP in conflict situations may require more emotionally involving test procedures than those widely used to date. There is a clear need for more emotionally involving, reliable, and valid procedures to assess SIP (see also Orobio de Castro et al., 2002). Standardized affect manipulations like the computer game used in this study may be a useful part of such procedures, as they make it possible to assess SIP in different emotional states. This would enable assessment of both optimal SIP competence when "calm, cool, and collected" and SIP performance in a negative emotional state and to assess the discrepancy between the two. Concerning treatment, the effect of negative feelings on SIP found in this study underscores the need to extend social–cognitive behavior training to real-life situations eliciting strong negative affect (see, for example, Lochman & Lenhart, 1993). Given the effects of negative emotions on their SIP, it is evidently insufficient to train highly aggressive boys to solve hypothetical SIP puzzles without actual emotional involvement. It may, however, be quite helpful for highly aggressive boys to learn to recognize their own negative emotional states in time and to know that their judgment may be somewhat extreme when they are in such a state.

Finally, the distinction made here between priming and induction of negative emotion is not always present in everyday life. In many cases, like in the Dodge and Somberg (1987) study, a single social stimulus does prime negative attributions *and* evoke negative feelings. In this study, we needed to make a sharp distinction between the effects of priming and negative emotion to be able to investigate their unique contributions to hostile attributions of intent by aggressive boys. In real-life social interactions, the effects of negative feelings and priming of negative intent may cooccur and together contribute to the escalation of social conflicts with highly aggressive boys.

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