



Aggressive personality traits in the effects of violent imagery on unprovoked impulsive aggression [☆]

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Abstract

In a three-factor design varying the aggressive-behavior subtraits of physical aggression (low, high) and hostility (low, high) with exposure to film content (innocuous, violent imagery), respondents were exposed to film segments and thereafter engaged in a teaching task that involved the administration of noxious feedback for unproductive efforts by the learner. A display informed respondents of the intensity of delivered feedback. Instructions were to provide feedback as often as required and of intensities deemed appropriate. However, respondents were also told to refrain from using extremely high intensities, as these intensities would be hurtful to the learner. None of the three independent variables exerted appreciable influence on the frequency of use of recommended feedback. In contrast, the frequency of the use of the disallowed, hurtful feedback was markedly affected. Independent of exposure to film content, men scoring high on hostility used impulsive aggressive responses more frequently than men scoring low on that subtrait. Within the subtrait of physical aggression, however, the degree of trait manifestation proved inconsequential for impulsive aggression, but exposure to the violent film segment resulted in more frequent use of impulsive aggressive responses than exposure to the innocuous film segment.

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1. Introduction

Reviews of research on the social consequences of exposure to violent imagery in the media of communication, whether solicited from agencies that serve the public interest (e.g., American Psychological Association, 1993; National Academy of Science, 1993) or deriving from personal initiatives (e.g., Donnerstein, Slaby, & Eron, 1994; Heath, Bresolin, & Rinaldi, 1989), have invariably projected a rather undifferentiated facilitation of hostile and aggressive behavior in society. Meta-analyses (e.g., Paik & Comstock, 1994; Wood, Wong, & Chachere, 1991) have similarly concentrated on showing that the research summarily gives evidence of aggression facilitation. Although gender differences in the impact of violent imagery were acknowledged in some of these reviews, the impression given is that essentially all individuals are at risk of being influenced, although probably to different degrees.

In recent years, however, much research on the influence of media violence has been conducted to overcome the indicated lack of effect specificity and to construct strata along which effects of distinct strength occur or do not at all materialize. Most of this work concerns the personality characteristics of respondents to media violence (cf. Zillmann & Weaver, 1997).

Bushman and Geen (1990) and Bushman (1996) focused on the moderating effect of the self-ascribed tendency to respond with physical aggression to provocation and established the usefulness of this personality characteristic for the investigation of media-violence effects. Employing the Buss and Perry (1992) procedure to ascertain individual differences in the subtrait of physical aggression (PA), Bushman (1995) showed that persons high in PA trait were more strongly drawn to violent media presentations than were persons low in PA trait. Bushman also showed, this time using the Buss and Durkee (1957) assault subscale, that exposure to media violence fostered aggressive dispositions in persons of high assault trait, but not in persons of low assault trait. Moreover, Bushman assessed aggressive reactions behaviorally within the reaction-time competition procedure (Bond & Lader, 1986; Taylor & Epstein, 1967) and demonstrated that the subtrait of physical aggression (Buss & Perry, 1992) moderates aggressive responding, as measured by the delivery of noise blasts to the opponent. Respondents high in PA trait, when provoked by intense blasts set by their opponent, delivered blasts of higher intensity after exposure to media violence than after exposure to innocuous material. In contrast, exposure of respondents low in PA trait to these presentations failed to show appreciable differences in blast intensities. Analysis of an unprovoked initial response (i.e. in a situation devoid of the threat of an intense blast from the opponent) largely replicated these findings.

To the extent that the sanction of the delivery of noxious noise blasts to another person, which is implicit in the indicated experimental procedure, can be accepted as a simulation of aggression, this latter part of Bushman's investigation suggests that exposure to media violence facilitates provoked aggressive behavior in persons scoring high, but not in persons scoring low, on the subtrait of physical aggression. It further suggests that unprovoked aggression is similarly facilitated by exposure to media violence.

Some inconsistencies in the trait-aggression mediation of asocial reactions to violent media presentations are apparent, however, Kiewitz and Weaver (2001) did not observe greater asocial callousness after respondents' exposure to violent than non-violent films, and Mathews et al. (2005) similarly failed to obtain differences in antisocial inclinations as a function of either trait aggressiveness or exposure to media violence.

A likely reason for such discrepancies in findings is the inconsistent use of trait assessments. The cited research has employed either the complete Buss–Perry aggression scale or selected subscales thereof. In addition, subscales of the earlier Buss–Durkee inventory were employed. This liberal use of different inventories has also plagued research in related areas, such as in the exploration of physiological concomitants of anger and aggressiveness. Nelson et al. (2005) tried to resolve discrepancies caused by the use of subscales from different inventories (Buss & Durkee, 1957; Buss & Perry, 1992; Cook & Medley, 1954). In their study, trait hostility emerged as a critical mediator of autonomic regulation. Hillbrand et al. (2005), examining risk factors associated with diminished autonomic regulation in anger and aggression, established a clear connection between such factors and high scores on the Buss–Perry subtraits of anger, hostility, and verbal aggression, but not of physical aggression. These findings not only suggest that a preparedness for physical defense is less damaging to health than the harboring of spiteful contempt, but also urge the use of aggression subtraits as autonomous indices that should be combined to an overall index only if they are known to be highly redundant.

In light of the significant involvement of trait hostility in the mediation of vital aspects of aggressive behavior, the present investigation involves both the subscale of physical aggression and the apparently pivotal subscale of hostility.

This investigation's objective is threefold. First, it is to discern whether the subtraits of physical aggression and hostility entail a degree of habitual preparedness for aggressive behavior that is not provoked by interpersonal conflict. Second, it is to determine whether exposure to violent imagery can elicit and thus facilitate socially unprovoked, impulsive aggressive reactions, such as in situations of frustration with a task, and whether any elicited reactivity is modified by the subtraits. The focus being on unprovoked physical aggression, the aggression subtraits of anger and verbal aggression were considered to apply, if at all, only remotely and hence were not involved. Third, it is to develop and evaluate a procedure for the measurement of habitual, impulsive aggression that is devoid of premeditation and perpetrated without social sanction.

Media-violence research has been partial to working within a provocation-retaliation paradigm (Geen, 1994). Indeed, exposure to media violence has largely failed to show the facilitation of unprovoked aggressive behavior (Zillmann & Johnson, 1973). It would seem premature, however, to conclude that provocation is a necessary condition for aggression facilitation by exposure to violent imagery. After all, a facilitation of unprovoked aggression was observed in some studies (Bushman, 1995). And independently, conditions may exist—like irritability from bad moods or physical ailments, generalized hostility, habitual aggressiveness, or plain frustration with daily challenges—that may prove sufficient stimulation for the evocation of targeted aggressive actions that are in no way provoked by the victim.

The evocation of such unprovoked aggressive behavior can be derived from the theory of cognitive priming as advanced by Berkowitz (1984) and Jo and Berkowitz (1994). This theory posits that the observation of violence activates existing networks of cognitions that pertain to aggression, that this activation lingers and gives impetus to interpreting subsequent situations in aggressive terms, thereby increasing the likelihood of aggressive action against parties present, including those who pose no appreciable threat. This reasoning has become part and parcel of the more inclusive cognitive-network theories proposed by Anderson and Bushman (2002) and Huesmann (1986). But more than others, Berkowitz (1982, 1983) emphasized the involvement of aversion in this activation of cognitions.

Specifically, he suggested that it is the aversive component of cognitive primes of aggression that instigates otherwise unmotivated aggressive actions. Frustration and similar irritations are thus viewed as volatile experiential states during which the observation of violence may trigger impulsive aggressive actions.

Considering the subtraits of physical aggression and hostility, it may be argued, in accordance with Berkowitz's theorizing (1982, 1983) and related research demonstrations (Bushman, 1996; Bushman & Geen, 1990), that persons scoring high in either subtrait, compared to persons scoring low, will have developed more complex cognitive networks pertaining to aggression and thus are more likely to resort to aggressive actions, even when these actions are not socially provoked. It may be expected, however, that persons scoring high on trait hostility are particularly prone to displaying socially unprovoked impulsive aggressive reactivity, as these persons' persistent discontent and ill will provides the motivation to lash out whenever social opportunities arise (Buss & Perry, 1992). Irritation from, or frustration with, a task at hand may define a sufficient condition for the evocation of aggressive impulsivity in highly hostile persons. Persons scoring high on the trait of physical aggression, in contrast, seem partial to social affront and assault. A glance at the items of this scale should make clear that the preparedness for impulsive aggression concerns hitting back (see Section 2). Although this aggressive preparedness may allow preemptive strikes, it is essentially defensive and retaliatory. It may therefore be expected that persons scoring high on the trait of physical aggression will show strong impulsive aggressive reactivity in response to provocation, but will not display such impulsion when not socially provoked. Irrespective of potential effects of exposure to violent imagery, this reasoning thus leads to the expectation that men scoring high on the hostility subtrait of aggression will engage in socially unprovoked and expressly disallowed impulsive aggressive actions more frequently than men scoring low on that subtrait. No parallel prediction is made for the subtrait of physical aggression.

The elicitation of socially unprovoked impulsive aggression may further be examined in emotion-theoretical terms (Zillmann, 1979, 1988). Such theorizing posits that behavior guidance is mediated by both automatic and deliberate cognitive processes, but explains impulsive behavior as a result of mostly involuntary excitatory reactivity. Specifically, impulsivity is considered to arise as persons meet persisting behavioral challenges. The response to such resistance tends to be experienced as frustration. Part of this experience is an energizing excitatory reaction, manifest in sympathetic activation that favors immediate resolution by action. Impulsivity is thus viewed as a form of impatience that calls for spur-of-the-moment action without adequate reflection (Dickman, 1990). If, during frustration, aggressive behavior is deemed a quick and effective means of impasse resolution, it defines an energetic course of action that is bound to be taken. The intensity of such impulsive aggressive behavior is likely to be influenced by preceding situational circumstances. Specifically, any lingering residual excitation, including that from exposure to arousing films, will enter into excitation instigated by the frustrating challenges and ultimately boost impulsive reactivity (Zillmann, 1996).

Concerning impulsivity as a personality characteristic, it may be speculated that persons high in either the subtrait of physical aggression or hostility have developed aggressive habits that are readily triggered by social affront. Research on impulsivity suggests that the formation of these habits may result from hereditary conditions such as impaired noradrenaline and serotonin transmission in limbic structures along with diminished functioning of the prefrontal cortex (Plutchik & van Praag, 1995; Stein, Towey, & Hollander,

1995) as well as elevated levels of endogenous systemic catecholamines and androgens (Fredrikson, Tuomisto, & Bergman-Losman, 1991; Manuck, Giordani, McQuaid, & Garrity, 1981). Considering persons with pronounced subtraits of either physical aggression and hostility, a significant difference in the formation of aggressive habits must be expected nonetheless. This is because persons scoring high on physical aggression prepare for physical actions that serve defense and retaliation, whereas persons scoring high on hostility prepare for a broader range of aggressive actions that serve the expression of their generalized discontent. Exposure to violent, arousing imagery that produces lingering residual excitation may thus be expected to facilitate socially provoked impulsive aggressiveness in those scoring high on either physical aggression or hostility. However, such exposure must be expected to facilitate impulsive aggressiveness that is not socially provoked in those scoring high on hostility, but not in those scoring high on physical aggression.

For the effects of exposure to the violent versus innocuous film segments, this reasoning leads to the expectation that men scoring high on the hostility subtrait of aggression will engage in socially unprovoked and expressly disallowed impulsive aggressive actions more frequently after exposure to violent and arousing imagery than after exposure to innocuous and non-arousing imagery. For men scoring low on the hostility subtrait of aggression, this difference will be less pronounced, if not negligible. Again, no parallel prediction is made for the subtrait of physical aggression.

As indicated already, most media-violence research has been conducted within a provocation-retaliation paradigm. Provocation was deemed necessary to entice aggressive reactions that are, of course, subject to social censure. In order to overcome the inhibitory consequence of this censure, procedures were devised to sanction aggressive behavior in laboratory situations. A degree of sanction was usually provided by the experimenter's apparent approval of the administration of noxious stimulation. Additionally, most procedures placed this administration into the service of a sanctioned goal. This social sanction of aggressive actions obviously violates the very conception of aggression as disapproved behavior and therefore has been subject to considerable criticism (Freedman, 1984; Zillmann & Weaver, 1999).

In efforts to improve the construct validity of the measurement of aggressive behavior, Zillmann, Bryant, and Carveth (1981) devised a procedure that removed the implicit sanction of noxious treatments. Research participants were requested to render help in the manual measuring of a confederate's blood pressure. The participants, who had been provoked by the confederate, were shown how to inflate the BP cuff and explicitly instructed not to over-inflate it, as over-inflation would be hurtful. Over-inflation beyond a specified point served as an unobtrusive measure of deliberate infliction of pain; that is, of aggression as transgressive behavior.

The procedure constructed for the present investigation adopts the described removal of the social sanction of aversive actions by expressly discouraging hurtful behavior, but differs in that it provides opportunities for impulsive hurtful behavior. Pumping up a blood-pressure cuff is a behavior that allows ample time for reflection, and it is the involvement of such reflective thought focused on the circumstances of the action that renders the behavior non-impulsive. The same argument applies to a recently employed measure of aggressive behavior that requires the contemplated, planned administration of presumably noxious, highly spicy sauce in the context of a taste test (Lieberman, Solomon, Greenberg, & McGregor, 1999). In order to make hurtful actions impulsive, then, two criteria need be met. First, respondents must be aware of violating sanctioned rules of conduct; and second, they

must react instantaneously to situations they seek to influence. The procedure employed in this investigation is designed to accommodate both of these stipulations.

2. Method

2.1. Overview

In a large sample of potential research participants, the traits of physical aggression and hostility were ascertained by the Buss–Perry Aggression Questionnaire. Several weeks after this assessment, male students in the lower versus upper quartile of the distribution of physical-aggression scores and in the lower versus upper quartile of the distribution of hostility scores were recruited for participation in a film study. In the focal trait classification, the alternative trait scores were disregarded (i.e., in the classification of physical-aggression scores, hostility scores were disregarded and *visa versa*; see *Assessment of Trait Aggression in the Results* for specifics on the covariation of scores).

In a factorial design varying physical aggression (low, high), hostility (low, high), and type of film content (innocuous, violent), respondents were exposed to film content and then placed into an interaction that required them to teach an arrangement skill to another student. The teaching involved the administration of noxious feedback to the learner for apparently ineffectual maneuvers in creating a particular arrangement. Respondents were instructed to administer feedback as often as required and of intensities they deemed appropriate. Specifically, the learner, appearing to work in the adjacent room but actually presented via a monitor from a prepared recording, was to be given frequent feedback by pressing handles that purportedly prompted a pressure increase in the inflated cuffs the learner was wearing. The respondent was thus led to believe that he could yank at either arm of the learner and do so with different force. A harder yank could therefore be thought to signal a particularly inappropriate move. Such yanking might be construed as legitimized because it was requested by the experimenter and additionally could be seen as assisting learning. In order to remove this possibility of perceived legitimization and make hard yanking explicitly transgressive, respondents were expressly told that excessive pressure would hurt the learner and, hence, that they should refrain from using it. A display of exerted pressure was in full view, such that respondents could not overlook their violation of the prohibition.

In order to maximize the respondents' frustration in his teaching role, the learner was made to seem rather inept initially. He frequently showed indecision and, on occasion, repeated erroneous moves. He succeeded only at the end of the last learning trial. Given these conditions, the use of higher levels of non-hurtful pressure is treated as a measure of somewhat elevated aggressiveness, showing at least an absence of qualms over performing noxious actions. The application of non-sanctioned, explicitly disallowed pressure, in contrast, is treated as a measure of impulsive aggressive behavior, indicating at least a readiness to use hurtful acts in venting frustration.

2.2. Respondents

One hundred and twenty male undergraduates at a large Southeastern university participated in the study. The students were enrolled in an introductory communication course that was university-wide required. The ethnic breakdown of this sample was 93%

Caucasians, 5% African Americans, and 2% remaining minorities. Participation in the investigation was voluntary. However, as inducement and compensation, the participants were promised and awarded extra course credit and movie-theater tickets. Students meeting the criteria for the trait classification were approached by the instructor of the communication course and invited to participate in a study of motion pictures and social interactivity. They were signed up for individual sessions.

2.3. *Experimental personnel*

Two male graduate students served as experimenters. One experimenter instructed each session's respondent and led him through the procedures. The other operated the video playback and the various response recorders.

2.4. *Trait assessment*

The self-perceptions of male students' aggressive dispositions were assessed by the Buss–Perry Aggression Questionnaire (BPAQ; Buss & Perry, 1992). In order to prevent recognition of a connection between this assessment and the later research participation, this questionnaire was administered along with other personality inventories that were not related to aggression. Participation in the survey was a voluntary in-class exercise. No mention was made of research projects in which some of the students would eventually participate. The students were assured that their responses would be kept confidential and would in no way affect their course grade. Students not able to participate in the in-class administration were given the opportunity to complete the questionnaire during the following week. The BPAQ was completed by 319 male respondents.

The Buss–Perry Aggression Questionnaire is composed of 29 items that are partitioned into four subscales: physical aggression, verbal aggression, anger, and hostility. Because the presented research addresses unprovoked overt aggressive action, both anger and verbal aggression were considered less germane than physical aggression and hostility and, in the interest of parsimony, were not employed.

2.4.1. *Physical aggression*

The physical-aggression subscale is composed of nine items, such as “If somebody hits me, I hit back,” “If I have to resort to violence to protect my rights, I will,” and “There are people who pushed me so far that we came to blows.” Responses to each item were recorded on a five-point scale ranging from “extremely uncharacteristic of me” (1) to “extremely characteristic of me” (5). In accordance with the procedure devised by Buss and Perry (1992), the physical-aggression subscale was computed by summing the nine items.

The subtrait of physical aggression is said to reflect a readiness for “hurting or harming others” whenever destructive action has instrumentality (Buss & Perry, 1992, p. 457). Inspection of the questionnaire items would seem to indicate that this instrumentality is primarily reactive: that is, either retaliatory in response to provocation or defensive in response to challenges.

2.4.2. *Hostility*

The hostility subtrait is composed of eight items, such as “At times I feel I have gotten a raw deal out of life,” “Other people always seem to get the breaks,” and “I wonder why

sometimes I feel so bitter about things.” This subscale was scored as already specified and computed by summing the eight items.

The hostility subtrait is said to reflect “feelings of ill will” from experiences of deprivation and injustice that foster aggressive actions as opportunities arise (Buss & Perry, 1992, p. 457). Persons scoring high on hostility appear to harbor non-specific grudges that inspire non-specific aggression upon minimal instigation.

2.5. Film type

The film segments were selected so as to maximize the differentiation of violent and non-violent content. They were about 8 min in duration. The films were presented on a 27-in. (68.58 cm) color monitor.

2.5.1. Innocuous

The innocuous film excerpt was taken from *Driving Miss Daisy* (1989, rated PG). The segment featured an aging retiree (Jessica Tandy) as she adjusts her daily schedule to accommodate the loss of her driving privileges. It proceeded with her son’s (Dan Aykroyd) hiring of an African-American man (Morgan Freeman) to serve as the retiree’s chauffeur. The segment, which ended with the chauffeur’s introduction to the retiree, entails tense moments but was entirely devoid of conflict and violence.

2.5.2. Violent

The violent film excerpt was taken from *Falling Down* (1993, rated R). It portrayed the rampage of a recently laid off, frustrated and irritable military defense worker (Michael Douglas) in a grocery store. The segment was extremely violent, depicting both an intense physical assault by Douglas’s character on the storeowner (Michael Paul Chan) and the subsequent wanton destruction of store stock by the assailant.

2.6. Procedure

Within the low and high groups of physical aggression and hostility, respondents were randomly assigned to one of the two film types (innocuous, violent). Respondents were tested in individual sessions. They were welcomed by the experimenters, and the forthcoming experimental proceedings were explained to them. After a first blood-pressure measure (basal) was taken, they were exposed to the excerpt from one of the two feature films. After rating their affective reactions to the film segment, a second blood-pressure measure (post-exposure) was taken.

Next, the respondents were moved to an adjoining room for an ostensibly unrelated study in non-verbal communication. They were told that they would play the part of the teacher in a teacher-learner cooperation task. Their specific assignment was to communicate with the learner by providing noxious feedback to the learner for inappropriate moves on a block-assembly task. It was explained that the learner, whom they would observe via a closed-circuit TV system, had three 1-min trials, separated by pauses of 15 s, in which he was to assemble differently shaped and colored building blocks (specifically, four red cubes, four green triangular prisms, and four blue cylinders) in a pattern known only to the teacher. After respondents were familiarized with the object of the assembly task (i.e., the horizontal placement of green triangular prisms atop red cubes,

forming red houses with green saddleback roofs), they were informed that they were to deliver noxious feedback for apparently unproductive moves by exerting pressure on two hand-held dynamometers. The pressure on these exercise grips was said to increase the pressure on the cuffs on the learner's arms. Specifically, pressure on the right-hand grip would pressurize the cuff on the learner's left arm and, analogously, pressure on the left-hand grip would pressurize the cuff on the learner's right arm. By depressing the dynamometer of one hand, the teacher thus could entice the learner to do something with his arm on the like side; and by depressing it hard, a degree of urgency could be signaled.

The closed-circuit TV showed the learner sitting at a table with randomly scattered building blocks before him. On both arms of the learner, pre-inflated pressure cuffs, along with thin hoses running to them, were clearly visible. Pressure display units were mounted on each side of the monitor. The left- and right-hand display was wired to the left- and right-hand dynamometer, respectively. The display units featured an easy-to-read LED column that indicated the momentary intensity with which pressure was applied to the corresponding hand dynamometer. The display units were clearly marked to indicate an upper limit for pressure application. The upper region of the LED column was marked by red tape to signal that pressure in this "red zone" would distress the learner.

Unbeknownst to the learner, the display units also conveyed voltages ranging from 0 (no pressure exerted) to 10 V (maximum pressure exerted) to a remote recorder that logged the respondent's pressure use for each hand dynamometer four times per second throughout the three trials. For data analysis, the frequency of pressure use in the allowed and the disallowed range (i.e., below and within the red zone) was accumulated per trial. Trials defined a repeated-measures factor that could be integrated in the physical aggression (low, high) by hostility (low, high) by film type (innocuous, violent) design.

During the first trial of the assembly task, the learner arranged blocks by type or color, either stacking them or moving them horizontally together. The various pairings never approached the target configuration, however. When the trial ended, apparently following instructions, he scrambled the blocks and rested his hands on the table. In the second trial, the learner continued to probe arrangements seemingly at random. With only 10 s remaining, he came close to creating the target configuration, but ultimately failed to achieve the objective. After again scrambling the blocks and resting his hands on the table, the final trial commenced. In the last third of this trial, with about 20 s to go, he finally managed to create the target configuration. Seemingly comprehending that he had arrived at the solution, the learner created three additional combinations of a green triangular prism atop a red cube.

After completion of the third trial of the assembly task, respondents were debriefed and thanked for their participation.

2.7. Instrumentation

2.7.1. Excitatory reactivity to films

Excitatory reactions to the films were assessed in systolic and diastolic blood pressures as well as in heart rate. An auto-inflating digital blood-pressure measuring device (Tycos model 7052-23) was employed in order to eliminate the potential influence on arousal from repeated immediate interaction between respondent and experimenter. After positioning the pressure cuff over the brachial artery of the respondent's unpreferred arm, the

experimenter activated the device, yielding readings of systolic and diastolic pressures as well as pulse via the auscultatory technique. Measures were taken prior to and following film exposure.

2.7.2. *Affective reactivity to films*

In addition to the assessment of excitatory reactions to the films, the respondents' emotional reactions were ascertained in ratings. Respondents indicated their reactions via film evaluations on 14 adjectives: amusing, arousing, boring, disgusting, distressing, enjoyable, exciting, entertaining, funny, irritating, terrifying, violent, wholesome, and well-produced. Responses were scored on an 11-point scale ranging from "not at all" (0) to "extremely" (10).

2.7.3. *Measurement of aggression*

The instrumentation for the measurement of aggressive responses involved three component parts: hand dynamometers, LED display units, and a digital recording system.

2.7.4. *Hand dynamometers*

Two dynamometers (Lafayette Instrument model 76618) provided the primary means of assessing the delivery of noxious and impulsively aggressive reactions. The hand-held dynamometer consists of a flat box with a protruding bilaterally attached handle. The handle is composed of one fixed and one spring-loaded movable grip element. Without exertion of pressure on the handle, these grip elements are discrepant. The exertion of pressure on the movable toward the fixed grip element, accomplished by forceful closure of the hand, diminishes the distance between these elements. Compression or "squeezing" of the grip, then, is met with resistance, and overcoming this resistance requires progressively greater force. The design of the dynamometer incorporates a potentiometer that is driven directly by the grip actuator and thus enables the rapid and accurate assessment of the respondents' force of compressing the device.

2.7.5. *LED display units*

The two LED display units were custom built for the dynamometers. They were mounted on both sides of the television monitor. Each LED display unit was 6 in. (15.2 cm) wide, 10 in. (25.4 cm) high, and 3.5 in. (8.9 cm) deep. The front of each LED display unit contained a 5 in. (12.7 cm) LED column that indicated, by fluctuation from bottom to top, the intensity with which pressure was applied to the dynamometer. A jack below the column was labeled "INPUT" and a sign read "LEFT HAND" or "RIGHT HAND" where appropriate. In addition to the LED display circuitry, each unit contained a power supply that provided DC voltage (0–10 V) to the dynamometer's potentiometer. The potentiometer deflections were directly conveyed to a digital recorder.

2.7.6. *Data recording*

The digital recorder consisted of a Keithley Instruments System 570 analog/digital converter and the Labtech Notebook software interface mounted in a desktop computer. The data for each respondent were recorded at a 4-Hz sampling rate. Each data set was composed of the time course of the voltages generated by the use of each hand dynamometer, with markers input by the experimenter who operated the digital recorder indicating the beginning and end of each trial of an assembly task.

To ensure that all respondents could exert consequential pressure on the dynamometer and do so with considerable frequency across the three 1-min test periods, the LED display units were calibrated. In a pretest with 12 men sampled from the same population as the respondents of the actual experiment it was determined that maximum grip pressure exerted across 15 repetitions over a 1-min period for each hand averaged at 104.2 pounds. Based on these observations, a maximum grip pressure of 50 pounds was deemed workable for all respondents. More specifically, the LED display units were calibrated to display pressures between 15 pounds (3 V) and 45 pounds (9 V). The base restriction in the range of displayable pressure use was applied because it became clear during pretesting that exertions of less than 10 pounds were invalid indicators of intentional action. Such exertions were frequently the result of hand adjustments on the grip or of inadvertent finger motion. Also to avoid confusion in the respondents about having sent feedback when they did not mean to do so, the lower threshold for display-column activation was therefore set at 15 pounds. The display units were set to show full illumination at the 45-pound threshold. Exertions were recorded up to 50 pounds (10 V), however. Most importantly, at the pressure of 30 pounds (6 V) and above, each display unit was obtrusively marked by red vinyl tape on both sides of the LED column. This marking signaled the zone of discouraged, if not disallowed, pressure usage.

2.7.7. Construction of measures of corrective reactions and impulsive aggression

The two focal measures of aggressiveness were computed after conversion of the voltage data into an ordinal variable with three levels. Responses yielding less than 3 V (i.e., incidental pressure on a dynamometer that was not displayed on the LED column) defined the first level and were labeled *incidental exertions*. Responses that did illuminate the column (greater than 3 V) in the sanctioned feedback range below the disallowed red-marked zone (less than 6 V) defined the second level and were coded as *corrective reactions*. Responses in the disallowed red-marked zone (greater than 6 V) defined the third level and were coded as *impulsive aggression*. Within these ordinal categories, the frequency of responses was then ascertained for the three trials of the assembly task. As there was no interest in lateral differences in the use of dynamometers, the data from each respondent's left and right hand were summed, however.

Corrective behavior assesses the dispensation of sanctioned, mildly noxious feedback for inappropriate reactions by a learner. As this measure does not assess transgressive behavior, it is not accepted as one of aggression. The measure, although non-essential to the focal object of this investigation, is nonetheless subjected to analysis. With all restraints removed from the use of this measured behavior, it is expected that persons, independent of subtrait and exposure to imagery, apply corrective feedback with similar frequency whenever the learner's inappropriate actions call for correction.

3. Results

3.1. Assessment of trait aggression

The respondents' scores on the Buss–Perry subtraits of physical aggression and hostility were subjected to ANOVAs in order to determine the effectiveness of the grouping of low versus high manifestation within these subtraits.

3.1.1. Physical aggression

The analysis of this subscale yielded $M = 6.8$ for low and $M = 27.5$ for high manifestation, $F(1, 58) = 520.68$, $p < .0001$, thus attesting to the success of the intended differentiation.

3.1.2. Hostility

The hostility scores were subjected to the same analysis. It yielded $M = 13.2$ for low and $M = 28.2$ for high manifestation, $F(1, 58) = 402.91$, $p < .0001$, also attesting to the success of the intended differentiation.

Correlation between subtrait scales. The differentiated subscales of physical-aggression and hostility were correlated with their jointly assessed parallel subtraits of hostility and physical-aggression, respectively: $r = .31$, $p < .001$, ($n = 120$). This finding is consistent with the report of a .28 correlation between these scales by Buss and Perry (1992).

3.2. Primary measures

3.2.1. Preliminary analyses

In order to learn about possible response differences in the three test trials, the data on corrective reactions and impulsive aggression were combined and subjected to a $2 \times 2 \times 2 \times 3$ mixed-measures ANOVA, with trait type (physical aggression, hostility), trait manifestation (low, high), and film type (innocuous, violent) as independent-measures factors and task trials (1–3) as a repeated-measures factor. This analysis yielded a main effect for trials, $F(2, 224) = 32.46$, $p < .0001$. The associated means, from trials 1–3, were 138.1, 122.2, and 102.3, all being different from one another at $p < .001$: trials 1–2, $t(224) = 3.57$; trials 2–3, $t(224) = 4.47$; trials 1–3, $t(224) = 8.04$. None of the interactions involving trials were significant, however. The main effect of trials appears to reflect the learner's progress in problem solving, especially toward the end of trial 3. In view of the absence of interactions, this effect was deemed uninformative, and it was consequently decided to combine the trials for further analyses.

3.2.2. Corrective reactions

The trait type (physical aggression, hostility), trait manifestation (low, high), and film type (innocuous, violent) ANOVA performed on this measure of the sanctioned use of noxious feedback failed to produce any appreciable effects. None of the design's sources of variation reached or even approached significance ($p = .18$ for the three-way interaction, $p > .21$ for all other sources). In performing their teaching assignment of providing correcting and guiding feedback to the learner, the respondents were apparently not affected by their aggressive traits, the degree to which these traits were manifest, or their exposure to innocuous versus violent films.

It should be mentioned that *incidental exertions* were not subjected to analysis, as inspection of the data on this variable of unintentional behavior showed only random fluctuations and, moreover, as there was no theoretical reason for expectations of effects pertaining to aggressiveness.

3.2.3. Impulsive aggression

The trait-type by trait-manifestation by film-type ANOVA performed on this dependent measure yielded three significant effects: a main effect for film type, $F(1,$

112) = 7.21, $p = .01$, an interaction between trait type and film type, $F(1, 112) = 5.53$, $p = .02$, and an interaction between trait type and trait manifestation, $F(1, 112) = 6.05$, $p = .02$.

The film-type effect shows that, independent of other considerations, exposure to the violent film ($M = 98.2$) yielded a markedly higher frequency of impulsive aggressive reactions than did exposure to the innocuous film ($M = 58.0$).

The trait-type by film-type interaction further elucidates the effect of film exposure on impulsive aggression. Considering trait hostility, the films actually failed to exert appreciably different influence: $M = 75.8$ for the innocuous film and $M = 80.8$ for the violent film, $p > .80$. The films' effect thus materialized specifically within the trait physical aggression: $M = 40.3$ for the innocuous film and $M = 115.6$ for the violent film, the difference being significant at $p < .001$, $t(112) = 5.04$. The observed effect of film exposure is therefore not only specific to impulsive aggressive reactivity, but also to the trait of physical aggression. The interaction between film type and trait type is displayed in Table 1.

The additional interaction between trait type and trait manifestation shows that, independent of film exposure, the manifestation of trait hostility affected impulsive aggression: $M = 45.4$ for low and $M = 111.1$ for high, significantly different at $p < .001$, $t(112) = 4.40$. In contrast, the manifestation of the trait of physical aggression did not exert an appreciable influence on impulsive aggression: $M = 81.9$ for low and $M = 74.0$ for high, $p > .70$. This interaction is displayed in Table 2. It should be mentioned that the main effect of trait manifestation approached significance: $F(1, 112) = 3.74$, $M = 63.7$ for low and $M = 92.6$ for high, $p = .056$. The interaction pattern makes it clear, however, that this effect is entirely the result of the strong differentiation in the trait of hostility.

Table 1
Unprovoked impulsive aggression by aggressive trait and exposure to imagery

Aggressive trait	Exposure to imagery	
	Innocuous	Violent
Physical aggression	40.3 ^{A,b}	115.6 ^{B,a}
Hostility	75.8 ^{A,a}	80.8 ^{A,b}

Note. Comparisons between means within trait (horizontal) are designated by uppercase superscripts. Comparisons between means within manifestation (vertical) are designated by lowercase superscripts. Different letters indicate significant differences at $p < .01$.

Table 2
Unprovoked impulsive aggression by aggressive trait and degree of manifestation

Aggressive trait	Degree of manifestation	
	Low	High
Physical aggression	81.9 ^{A,b}	74.0 ^{A,a}
Hostility	45.4 ^{A,a}	111.1 ^{B,b}

Note. Comparisons between means within trait (horizontal) are designated by uppercase superscripts. Comparisons between means within manifestation (vertical) are designated by lowercase superscripts. Different letters indicate significant differences at $p < .01$.

3.3. Secondary measures

3.3.1. Excitatory reactions to the films

For all employed measures of excitatory reactivity (i.e., SBP, DBP, and HR), change scores were computed by subtracting the basal measure (pre-exposure) from the measure taken after film exposure (post-exposure).

The trait type by trait manifestation by film type ANOVA performed on systolic blood-pressure changes yielded only one significant effect: an interaction between trait type and trait manifestation, $F(1, 112) = 5.96, p = .02$. All cell means were negative, indicating that SBP had declined after film exposure (relative to the basal first measures). But more specifically, within the trait of physical aggression the low scorers ($M = -2.9$) showed less decline than did the high scorers ($M = -8.6$), the difference being significant at $p < .005, t(112) = 2.85$. For the trait of hostility, the difference was in the opposite direction, but not significantly so.

The effect pattern for SBP thus suggests that arousal levels were initially higher than after film exposure, that there is no indication of a different excitatory impact of the two films, and that respondents scoring high on physical aggression seemed particularly unaffected by events between the two measurements.

The ANOVAs performed on the DBP and HR scores failed altogether to yield significant results: $p > .25$ for all sources of variation. However, consistent with the SBP analysis, all DBP cell means were negative and thus also suggested excitatory decline.

Negative as these results are, they do not necessarily suggest that the films lacked excitatory quality and that they even relaxed the respondents. It is conceivable that the respondents were aroused as they entered a novel, possibly threatening laboratory environment and learned about a challenging teaching assignment and that, under these conditions, the exposure to film, even if arousing in initially tranquil situations, could not add to the earlier instigated increase of arousal. It would seem prudent, however, to accept that the findings provide no evidence whatever of excitatory reactions to the films.

3.3.2. Affective reactions to the films

The ratings on the 14 affect-sensitive scales were subjected to a principal components factor analysis followed by oblique rotation. The analysis produced a two-factor solution that accounted for 56.0% of the variance. The first factor, labeled Pleasure, was defined by enjoyable, entertaining, amusing, funny, and boring (reverse-scored). The second factor, labeled Displeasure, was defined by violent, terrifying, distressing, irritating, and wholesome (reverse-scored). Given acceptable inter-item consistency (for Pleasure, $\alpha = .86$; for Displeasure $\alpha = .81$), the five high-loading scales were averaged in factor indices and independently subjected to the $2 \times 2 \times 2$ ANOVAs.

The analysis of the Pleasure factor yielded only one significant effect: the main effect of film type, $F(1, 112) = 7.00, p < .01$. Pleasure in response to the violent film ($M = 6.49$) exceeded that in response to the innocuous film ($M = 5.56$).

The analysis of Displeasure also yielded the main effect for film type as its only effect, $F(1, 112) = 357.65, p < .0001$. Exposure to the violent film ($M = 4.24$) fostered greater Displeasure than did exposure to the innocuous film ($M = 0.74$).

The analysis of individual ratings provides information that is more directly relevant for the attempted manipulation. The ANOVA of violent, for instance, yielded a main effect for film type as its only significant effect: $F(1, 112) = 464.22, p < .0001$, with $M = 0.00$

for the innocuous film and $M = 6.88$ for the violent film. Although this differentiation must be considered inflated because of the lack of variation in the ratings of the innocuous film, the manipulation of non-violent versus violent film content was unquestionably effective.

The ratings of arousing and exciting are informative as well. The ANOVAs of both ratings yielded main effects for film type as the only significant effects: for arousing, $F(1, 112) = 31.71, p < .0001$, and for exciting, $F(1, 112) = 88.81, p < .0001$. On both measures, the violent film ($M = 4.12$ and 6.57 , respectively) was rated higher than the innocuous film ($M = 1.28$ and 2.42 , respectively). At least in term of subjective experience, then, the violent film proved more arousing than its non-violent counterpart.

4. Discussion

Expectations concerning the aggression subtrait of hostility are clearly supported by the findings. Highly trait-hostile men engaged more frequently in socially unprovoked and expressly disallowed impulsive aggressive behavior than did men of low trait hostility. Because this difference in aggressive behavior is specific to impulsive reactivity that knowingly violates social sanctions, and also because a similar differentiation of noxious reactions within sanctioned bounds could not be observed, this finding is consistent with the argument that highly trait-hostile persons are motivated by deprivation-based resentment and ill will to inflict harm upon others whenever opportunities arise (Buss & Perry, 1992), especially so when these opportunities entail the transgression of social standards. These standards are apparently honored by persons low in trait-hostility.

The present findings focus on socially unprovoked aggression. It is not implied, however, that they are limited to this type of aggression. A recent investigation of the influence of violent imagery in video-game play on provoked aggression (Bartholow, Sestir, & Davis, 2005) suggests, in fact, that trait-hostility, in combination with callousness about victim suffering due to deficient trait empathy, is a crucial mediator of provoked aggressive reactivity. A related investigation that used the Cook and Medley (1954) scale to ascertain trait hostility also found hostility to be central in mediating the effect of violent video-game play on aggressive actions of various kinds (Gentile, Lynch, Linder, & Walch, 2004).

The lack of a differentiation of unprovoked impulsive aggressive behavior within the subtrait of physical aggression contrasts with the earlier cited demonstration of differences in provoked aggressive behavior (Bushman, 1995). The observed differences in question were, however, the result of an interaction with exposure to media violence. Specifically, persons high in the trait of physical aggression were greatly affected by exposure to violent imagery. It was this pronounced effect that created the overall main effect for persons low versus high in physical aggressiveness, despite the fact that low versus high scorers who were exposed to innocuous media material did not appreciably differ in their aggressiveness. Yet, the more important consideration is that the trait of physical aggression, as argued before, is essentially one of defensive and retaliatory aggression, and that the conditions of the present investigation in no way invited or called for retaliation. The absence of a low-high trait differentiation for unprovoked aggression thus is within expectations.

In contrast to the support given to the subtrait expectations, the findings lend no support whatever to the predictions concerning exposure to violent versus non-violent films. Expectations focused on men of high trait-hostility and projected that such men would engage more frequently in socially unprovoked and expressly disallowed impulsive

aggressive behavior after exposure to violent imagery than after exposure to innocuous material. No such difference was observed.

The prediction was based on the assumption that violent imagery would produce an appreciable increase in sympathetic excitation, and that residues thereof would enhance impulsivity. As the presumed excitatory effect, measured in blood-pressure and heart-rate changes, did not materialize, the basis for the prediction may be considered void and the hypothesis therefore inapplicable. However, as the respondents felt themselves to be more aroused after exposure to violent imagery than after exposure to neutral material, this reasoning may be deemed unconvincing. Consistent with findings showing associative networks of aggressive cognitions more activated after exposure to violent imagery than after neutral material (Bushman, 1996), it might be argued that this “cognitive excitation,” which may have expressed itself in the respondents’ feelings of excitedness, should have created a stronger readiness for men who had seen the violent imagery to engage in impulsive aggressive behavior. This interpretation may also be derived from the cognitive-network theories of Anderson and Bushman (2002) and Huesmann (1986).

In view of the fact that such likely cognitive excitedness did not result in a facilitation of aggressive impulses either, it would seem prudent to suggest that highly trait-hostile persons have developed a sufficiently complex aggression-focused cognitive network to respond impulsively without additional enrichment and instigation by exposure to violent imagery. In other words, highly trait-hostile persons appear to be so strongly predisposed or motivated to respond to opportune conditions in a non-reflective, impulsively aggressive manner that additional instigation can only be redundant and inconsequential.

The findings that concern the effect of exposure to violent imagery by men of any degree of manifestation of the subtrait of physical aggression are entirely unexpected and surprising. The stated expectation of exposure inconsequence was based on the assumption that, given the absence of social provocation, respondents would deem all defensive and retaliatory reactions inappropriate. Such presumably habitual contemplation, if not de facto pre-contemplation, should have inhibited impulsive reactivity in persons with some degree of the trait of physical aggression. The observed greater frequency in the use of socially unprovoked and expressly disallowed impulsive aggressive reactions after exposure to violent imagery, as compared to innocuous material, thus is in need of an explanation.

As argued in connection with the behavior of persons of high trait-hostility, residual sympathetic excitation is not in evidence and hence, cannot account for the facilitation of impulsive aggression by exposure to violent imagery. The increased cognitive excitation, in association with the subjective experience of excitedness, holds more promise. Specifically, it may be argued that the activation of networks of aggressive cognitions (Anderson & Bushman, 2002; Berkowitz, 1984; Huesmann, 1986) served as primes or triggers for aggressive reactions, especially for aggressive reactions under circumstances similar to those recently witnessed. In this connection, the degree of affinity between the witnessed impulsivity of actions and the performance of entirely reflection-free impulsive reactions must be considered. As will be recalled, the violent film segment featured a man who is frustrated by a comparatively minor challenge, whose frustration and irritation then escalates in response to further minor challenges, and who eventually erupts in impulsive destructive actions that are incommensurate with the irritating circumstances.

The essential message of these depictions would seem to be that a person vents his frustrations in a burst of impulsive transgressive actions. If this abstraction is construed as a

behavioral script (Huesmann, 1986), the film segment's impact may be seen as a consequence of the cognitive imposition of a script that transitorily affected behavior of sufficient affinity, such as frustration-based impulsive aggressive behavior. The stipulated script imposition is not expected to reach awareness, nor is it presumed to entail elements of reflection or even careful planning. To the extent that this interpretation has merit, the influence of exposure to behavioral scripts defines a default system for impulsive aggressive reactivity that does not extend to, in fact sharply contrasts with, reflective and contemplated aggressive reactions.

Given these conditions, then, the portrayal of murder by poison in a clever non-violent plot or of the bloody dismemberment of soldiers hit by a grenade, for instance, may not have fostered the reported effects on unprovoked impulsive aggression for lack of sufficient affinity between witnessed and performed behavior. In terms of theory development and evaluation, the arising question is (a) whether the activation of networks of aggressive cognitions may be comparatively non-specific as far as witnessed and enacted instigating conditions and agonistic expressions are concerned, or (b) whether a substantial degree of affinity between witnessed aggressive scripts and enactment opportunities constitutes a necessary condition for the facilitation of aggression. The first model, usually invoked in connection with Berkowitz (1984) and Jo and Berkowitz (1994) proposals of aggression facilitation by activation of associative networks, is mostly taken to mean that exposure to imagery of physical violence, regardless of its incitement and motives, will facilitate any kind of aggressive behavior, also regardless of its incitement and motives. The second model, in contrast, insists that the incitement and enactment conditions are vital to the conception of scripts and that exposure to particular aggression scripts will facilitate aggressive behavior only within the confines of the scripts. These theoretical issues are obviously left unresolved by the present investigation and await clarification by future explorations.

Irrespective of these considerations, and returning to the observations concerning men's subtrait of physical aggression, the present findings suggest that, quite independent of this trait, men are vulnerable to the priming of aggressive reactions by exposure to violent behavior. More specifically, they are vulnerable to such priming influence in becoming impulsively aggressive when meeting challenges that are devoid of threats against them personally. It remains unclear, however, to what extent alternative personality characteristics, such as irritability (Caprara et al., 1985) and impatience/impulsivity (Dickman, 1990), might exert influence and thus also explain, at least in part, the facilitation of unprovoked impulsive aggressive behavior via exposure to imagery of violence.

Finally, this paper is but a first step in the exploration of aggressive trait consequences for unprovoked, impulsive aggressive reactivity. The present findings are obviously confined to two selected aspects of trait aggression and leave numerous potentially consequential alternative factors unaddressed. Moreover, it must be acknowledged that these findings are limited to the comparison of groups with very low versus very high trait manifestations. To the extent that neither the trait aspect of hostility nor that of physical aggression is not bi-modally distributed, such sampling of extremes can only produce preliminary results. It must be assumed that the trait aspects in question are evenly or, more likely, normally distributed along continuous scales and that, therefore, the present findings, as they do not represent the midsection of the subtrait distributions, fail to provide a complete analysis.

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