The influence of violent media on children and adolescents: a public-health approach

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There is continuing debate on the extent of the effects of media violence on children and young people, and how to investigate these effects. The aim of this review is to consider the research evidence from a public-health perspective. A search of published work revealed five meta-analytic reviews and one quasi-systematic review, all of which were from North America. There is consistent evidence that violent imagery in television, film and video, and computer games has substantial short-term effects on arousal, thoughts, and emotions, increasing the likelihood of aggressive or fearful behaviour in younger children, especially in boys. The evidence becomes inconsistent when considering older children and teenagers, and long-term outcomes for all ages. The multifactorial nature of aggression is emphasised, together with the methodological difficulties of showing causation. Nevertheless, a small but significant association is shown in the research, with an effect size that has a substantial effect on public health. By contrast, only weak evidence from correlation studies links media violence directly to crime.

The notion that violence in the media contributes to the development of aggressive behaviour has been supported by meta-analyses[1] of relevant research.[2,3] However, there is continuing debate about (1) methodological approaches used in the research and their generalisability, and (2) the extent to which media violence affects children and young people.[4–8] This debate shows the typical divide between so-called media pessimists[9] who believe that media violence can be very harmful to children and adolescents, and media

Search strategy and selection criteria

The search strategy for this review was designed to identify new articles on the effects of media violence on children and young people up to the age of 18 years. Therefore, the following search engines (which occasionally overlap) and dates were used:

- ATLAS: Applied Social Sciences Index and Abstracts (ASSIA), BIDS, ERIC, FRANCIS, Medline, Science Citation Index, Social Services Abstracts, Web of Science/Web of Knowledge): 1998–2003.
- Cambridge Scientific Abstracts: ASSIA, British Humanities Index, ERIC, Social Sciences Abstracts, Sociological Abstracts: 1998–2004
- ISI Web of Science: 1998–2003
- OVID: MEDLINE, EMBASE, BIOSIS Previews: 1998–2004
- PsychInfo 1998–2004
- Science Direct: 1998–2003
- Social Science Information Gateway: 1998–2003
- SwetsWise: 1998–2003
- TalisWeb Opac: 1998–2003
- TDNET: 1998–2003

The search terms included every combination of the words "media", "television", "film", "video", "song lyrics", "radio", "music", "computer games", "video games" AND "violence", "crime", "aggression" (eg, "media AND violence", "computer games AND aggression"). Appropriate sources from the reference lists of these articles were also considered.

sceptics[10,11] who claim that there is no reliable evidence to support this view. Ironically, this topic is regularly in the news headlines as an explanation of violent crime by young people. The idea that some individuals are more susceptible than others to the effects of violence in the media has provided a balance between these two extreme viewpoints,[12] with some researchers emphasising the role of social and environmental experiences to explain individual differences.

There are many publications about the effects of media violence, mainly from North America. However, few investigations have considered the laboratory (experimental) and community (cohort) evidence systematically—for example, the statistical summation of similar studies using meta-analytical techniques that result in an overall effect size. A search through the published work revealed only five meta-analytic reviews and one quasi-systematic review, all of which were North American. Two meta-analyses included research on the effects of television and film violence (passive media,[2,3] and the remaining four publications included the effects of video and computer game violence (interactive media).[13–16] The aim of this review is to consider research evidence on the effects of violent media on children and adolescents from a public-health perspective. WHO has emphasised the necessity of adopting a public-health approach to the prevention of violence and the reduction of mortality and morbidity in societies.[17] Although WHO's *World Report on Violence and Health*[17] does not specifically address violence in the media, it does discuss the effect of media messages on health promotion. The report emphasises the need for health services to be associated with the prevention of violence through family and community interventions.

A public-health perspective on media violence might be defined as considering the effects of violent imagery on the child within the broader context of child welfare, families, and communities. Hence, in addition to the habits and behaviour of the child or adolescent viewer, the behaviour of parents in monitoring the use of

televisions and computers and knowingly or unknowingly allowing access to violent imagery should be considered. Furthermore, the role of communities and societies in providing standards, guidelines, and education to families also needs assessment. Attention can then be directed to public-health interventions to reduce the extent and effect of violence in the media for the whole population (universal interventions) and high-risk individuals (targeted interventions), respectively. The definition of violence most relevant to visual media is "the exercise of physical force so as to injure or damage persons or property; otherwise to treat or use persons or property in a way that causes bodily injury and/or forcibly interferes with personal freedom".[18] To integrate psychological and sociological approaches, there is a need to assess violent images within the context of relationships and social interactions. Indeed, the portrayal of violent interpersonal interactions is of particular concern to the British Board of Film Classification (panel 1).

Television viewing habits and parental monitoring

The UNESCO Global Media Violence Study[8,19] showed that there is remarkable consistency in children's television viewing habits across 23 countries. In electrified urban or rural areas, 93% of children who attend school spent more than 50% of their leisure time watching television. For example, in England, according to the Independent Television Commission's research survey in 1998, 46% of children have a television in their bedroom and only 43% of parents monitor and prevent their child watching unsuitable programmes.[20] In a separate survey of English parents in the same year, the investigators showed that most parents believe that television affects the way their children talk (75%), dress, and behave (about 60%).[21] In the US National Television Violence Study,[22] the violent contents of television were investigated. The survey showed that 61% of programmes contained violence, but only 4% had an anti-violence theme. Violence in realistic settings was shown in 55% of programmes, but only 16% showed long-term negative consequences and in 45% of programmes the offender went unpunished. Of more concern was that in 71% of scenes, there was no

criticism of or remorse for the violence and 42% of the violence was associated with humour. Lethal violence was shown in 54% of programmes, which was committed by attractive people in 39% of cases.

Effects of television and film violence

Compared with television violence, much less research has been done on the specific effects of violent films, although there is a great deal of overlap in the studies of these two forms of passive viewing, as films are usually viewed on television through direct transmission, and through video and DVD. In the largest international review of more than 1000 studies before 1991[23] the researchers concluded that there is a positive association between violent entertainment and aggressive behaviour, although some group and cultural distinctions were evident. From a public-health perspective, the most compelling evidence for the antisocial effects of television comes from naturalistic approaches with longitudinal methodology, as shown by two investigations from the USA.

In the first study, the television viewing habits of a community sample of 707 individuals over a period of 17 years were assessed.[24] In the USA an average of 20–25 violent acts are shown in children's television programmes each hour, with an average of three to five violent acts during prime-time television viewing. High exposure to television has been assumed to be likely to lead to high exposure to television violence. A significant association was reported between the amount of time spent watching television during adolescence and early adulthood (with accompanying probable exposure to violence) and the likelihood of subsequent antisocial behaviour, such as threatening aggression, assault or physical fights resulting in injury, and robbery. This association remained significant after controlling for previous aggression, childhood neglect, family income, neighbourhood violence, parental education, and psychiatric disorders, although rates of actual violence watched were not measured. The second US study,[25] with a cohort of 557 children, also provided longitudinal evidence, but the investigators looked specifically for a link between children's exposure to television violence and aggressive behaviour in young adulthood. Children aged 6 to 9 years in late 1977 were followed up 15 years later. Structural equation modelling showed that childhood exposure to media violence was predictive of aggressive behaviour in early adulthood in both men and women, even when controlling for socioeconomic status, intelligence quotient, and various parenting factors (eg, parental viewing habits and aggressive behaviour). Identification with aggressive television characters and perceived realism of television violence also predicted later aggression.

Meta-analytical studies have also shown that aggressive or antisocial behaviour is heightened in children and adolescents after watching violent television or films.[2,3,26]

Panel 1: **British Board of Film Classification Guidelines (2000)**

Classification and censorship of violence in cinema and video films is based on whether scenes include:

- Portrayal of violence as a normal solution to problems
- Heroes who inflict pain and injury
- Callousness towards victims
- Encouraging aggressive attitudes
- Taking pleasure in pain or humiliation

In a meta-analysis of 217 published and unpublished studies, Paik and Comstock[3] showed a highly significant overall association between exposure to television violence and aggressive or antisocial behaviour (d=0·65, r=0·31), with a small effect for criminal violence (d=0·20, r=0·10) (inferential statistical tests were used according to procedures described by Rosenthal[27]). Overall, boys were more susceptible to violence than girls, with young children (aged 0–5 years) showing the highest effects (d=1·02), followed by older children (aged 6–11 years) (d=0·65) and adolescents (aged 12–17 years) (d=0·46). Cartoons and fantasy had the most effect of violence-only programmes, but violence with erotica had an even stronger effect.

Wood and colleagues[2] reviewed 28 experiments in which children and adolescents were observed for spontaneous aggression during social interaction. Similarly to Paik and Comstock[3], they acknowledged that not all studies showed an effect but, when findings were combined in the meta-analysis, children and adolescents were significantly more aggressive after watching violent television programmes or films (d=0·40). These two meta-analyses on the effect of violence in television or film on children and young people showed small to medium effects for media violence on aggressive behaviour (d=0·27 to 0·65)—Cohen's rule of thumb: d=0·20 is a small effect, 0·50 is a medium effect, and 0·80 is a large effect.[28] As a comparison, an effect size of r=0·26 (d>0·40) "is larger than the effect of condom use on decreased HIV risk, the effect of exposure to passive smoke at work and lung cancer, and the effect of calcium intake on bone mass".[29]

Overall, a small but significant link between aggressive behaviour and violence on television and film has been shown in most studies, reviews, and meta-analyses, many of which are North American.[3,23–26,30–32] However, few investigators have considered the relation of background factors such as family violence with the effects of media violence so that the relative contribution of media violence to aggressive behaviour is difficult to establish. Additionally, in the UK and elsewhere, there is less consensus on this issue and greater criticism of the methodology used in many studies,[4,33,34] although others do not believe these methodological limitations negate the conclusions.[9,35] Critics have also pointed out that associations between aggression and media violence are quite distinct from causal relations.[35] Thus, further studies using more advanced statistical techniques, such as mediational or structural equation modelling (as in Huesmann and colleagues' investigation[25]), are needed to show causality with passive viewing, while considering the complex interaction between sociodemographic factors and contextual features of the violence.[22,33]

Effects of violence in other medias

Music lyrics and videos might also have passive effects.[36,37] Only a few experimental studies have been done, but these seemed to show desensitisation to violence after watching violent music videos in both the short-term and long-term.[38–40] However, psychologists generally believe that any interaction with violent or sexual imagery will have greater effects because the person might be reinforced (eg, image intensifies) or punished (eg, image is lost), leading to a learning process for the viewer.[41] With the popularity of video games since the mid-1980s and sophisticated computer games since the mid-1990s, the viewer can now interact actively with the image, and this fact has received increasing attention.[7,37,42–44]

There are three meta-analyses of video and computer game research,[13,15,16] and one quasi-systematic review.[14] Anderson's meta-analysis[15] confirmed his earlier meta-analytic findings[13] that violent video and computer games amplify physiological arousal, aggression-related thoughts and feelings, and reduce pro-social behaviour with a small to medium effect size similar to the effects of television and film violence (r=0·18–0·27). He also showed that methodologically strong studies revealed bigger effects than studies with methodological weaknesses. In a meta-analysis[16] of violence in video and computer games Sherry also concluded that exposure resulted in subsequent aggressive and antisocial behaviour, but with a smaller effect size (d=0·30, r=0·15). However, this effect size had risen over time, with the year of study most predictive of effect size in a regression. Over time, games have become more realistic and life-like, and games with human characters had more effect than abstract violence. Thus, differences in the types and quality of violence being portrayed should be considered.

In the quasi-systematic review[14] the researchers reported results from 19 studies from 1984 to 2000 involving children and adolescents. Nine studies included children aged 4–8 years, but only four of these studies used aggressive play and behaviour as the outcome measure, and in three of them experimental evidence of heightened aggression after exposure was noted. The remaining ten studies were in older children, teenagers, and young adults, but there was no clear evidence of an association between exposure to video and computer games and heightened aggression. However, most of these studies were non-experimental and predominantly used self-reported aggression, antisocial behaviour, and mood as outcome measures. Similarly to previous narrative reviews[42,45] the quasi-systematic review concluded that there is an association, but the evidence so far is mostly from young children and only shows a short-term rise in free-play aggression after use of violent video games.[45] Nevertheless, other authors believe the evidence shows that violent video games are related to later aggressive behaviour and delinquency in older children and teenagers, especially in boys and young men and in those individuals who were characteristically aggressive.[46] Young women (18–22 years) exposed to a violent video game had increased aggressive behaviour and the effect on aggression was greater when the player controlled the

same sex violent game character.[47] Overall, for both passive viewing (television and film) and interactive viewing (video and computer games), there seems to be consistent evidence of an association between younger children watching media violence and showing more aggressive play and behaviour, although this is mainly short-term. From a developmental perspective, this evidence might be attributable to the child's stage of cognitive development, in which abstract thought, characteristic of teenagers and adults, has not yet developed. From a public-health perspective, little emphasis has been placed on individual differences between children, with an assumption that the effects on all children will be the same, which might not necessarily be the case.

Role of other factors and susceptibility to violent entertainment

Research on vulnerable groups has shown that some children and adolescents are more susceptible to media influence than others.[48–50] The UNESCO review of research findings[8] suggests that everyone is negatively affected in some way by media violence, but that these effects depend on an individual's cognitive appraisal and physical and social environment. One of the basic criteria is sex; evidence suggests that men are more desensitised to interpersonal conflict after exposure to media violence than women.[51] In a South African study of 284 female students, the women reported that they felt disempowered by exposure to media aggression.[52] Personality factors such as temperament also appear to have a mediating role, with some research suggesting that high-trait aggressive men are most affected.[51,53]

People with mental health problems or those viewing media violence under the influence of alcohol or drugs might also be susceptible to violence. Individuals with mental health problems might believe the images they see and transpose representations of violent behaviour onto themselves, affecting their view of self and others around them.[54] However, no firm conclusions can be drawn on the basis of the little research done in this area. Other factors also play an important part in an individual's predisposition for violence. Genetic predisposition affects neurocognitive functioning, temperament, personality, autistic spectrum disorders, schizophrenia, affective disorders, conduct disorder, and attention deficit and hyperactivity disorder. All might have the potential to change a child's behaviour.[55] Therefore, the effects of media violence will only account for a proportion of an individual's predisposition for aggressive behaviour. The relative contribution of media violence to aggressive behaviour is thus difficult to assess.

Further complications are family, social, and environmental factors, which have an important role in the development of aggressive and antisocial behaviour.[56] For example, growing up in a violent family and being a victim of violence or witnessing violence between others is known to have a strong effect on a person's predisposition to act aggressively.[56–59] This background, in turn, could raise the likelihood of mental health problems (eg, post-traumatic stress disorder) and substance misuse, further heightening the chances of violent behaviour.[17] Indeed, some workers propose that dysfunctional family environments affect the way individuals respond to media violence.[59–61] Furthermore, others claim that teenage reactions to media violence are linked to their experience of real-life violence.[59,62,63] The family's television viewing habits, attitudes to violence, socioeconomic status, and cultural background should also be taken into account.[23] Indeed, family and social factors potentially confound the effects of media violence. Nevertheless, Huesmann and colleagues[25] assert that the effects of media violence on children and adolescents persist even when socioeconomic status, intelligence, and parenting are taken into account, suggesting that some of the influence is independent of other factors.

Multifactorial approaches

In view of the complexity of influences on aggression, theoretical explanations of a link between exposure to media violence and aggression need a multifactorial approach. Previously, classic theories of aggression have been used to explain the effects of media violence.[44] For example, social learning theory[64,65] asserts that exposure to media violence would produce arousal and imitation, and reinforce aggressive play. Furthermore, the cognitive neo-association model of aggression proposes that media violence might prime aggressive ideas, feelings, and actions that are already present.[66] The importance of cognitive processes on patterns of aggressive behaviour has been recognised for many years in the treatment of violent individuals and anger management.[67] The role of social cognitions (eg, hostile attributional bias) in thoughts of physical confrontation has been especially emphasised, with authors asserting that violent individuals are affected by media violence.[68–70] In relation to the effects of media violence, there has been an attempt to integrate theoretical approaches into a general aggression model.[71] This model is based on the principles of cognitive behavioural theory,[72] which explains interactions between the person (eg, temperament, moral attitudes, and empathy for others) and the environment (eg, exposure to violence). The model claims that an individual's response (behaviour) to a violent video game is established by the interaction between his perception of it (cognitions), emotions (affect), and arousal (physiology). This model supports the viewpoint expressed in the longitudinal study comparing the effects of television on children in Finland and the USA,[73,74] which concluded that there was a "bi-directional causal effect in which violence viewing engendered aggression, and aggression engendered violence viewing".[73]

The multifactorial importance of considering individual, social, and media influences associated with antisocial behaviour has been explained in one peer-reviewed UK government study. In this study, a discriminant (multivariate) analysis was used to distinguish young people who have committed criminal offences from those who have not.[48,75] The analysis confirmed that, within these samples, individual and social characteristics were more important than factors associated with violent films for significantly predicting those who had committed criminal offences (panel 2).

Media violence, delinquency, and crime

Several risk factors have been repeatedly linked to delinquency and crime, such as poverty, one-parent families and an absence of parental care, and affection coupled with inconsistent discipline and severe physical punishment.[56] These background characteristics have also been linked to susceptibility to screen images.[48,59,77] Furthermore, forensic psychiatrists have anecdotally reported cases of young people who have been affected by violent scenes in their perpetration of homicide and sexual offences.[78,79] For example, Sue Bailey[78] investigated 40 adolescent murderers and 200 young sex offenders. She claimed that repeated exposure to violent and pornographic videos was an important factor in violent and sex crimes including, in some cases, actual imitation of the screen image. Indeed, a prevalence study of copycat crime claims that one in four violent juvenile offenders have attempted to imitate crime depicted in the media.[80]

A mainly North American review[81] concluded that empirical evidence for the notion that media violence causes crime is weak. Although many positive links are evident in published work, these are concentrated on methodological designs that prove correlation rather than causation.[81] The studies that used prospective, longitudinal designs relied heavily on peer-nominated aggression as an outcome measure, rather than objective criteria related to crime. Therefore, the review concludes that, "evidence for an effect on criminal behavior is practically nonexistent".[81] This conclusion is not surprising since most studies reviewed did not directly measure delinquent and criminal behaviour. Indeed, only one of the 12 experimental/quasi-experimental studies identified used violent criminal behaviour as an outcome measure and this one did find an effect.[82,83] The study matched violent inmates and non-convicted young men and recorded a small effect of violent media exposure. Further analysis[83] showed that when violence was also present in the home, there was an interaction between hours spent watching television during childhood (not violent television specifically) and violent crime as a teenager. These findings are consistent with a quasi-experimental UK study, which reported that the effects of film violence were greater in those young people who had grown up in violent families.[75,76]

Panel 2: Individual, social, and media influences in order of strength of association with antisocial behaviour in 122 young men (aged 15–21 years) established by discriminant functional analysis[75,76]

- Thoughts of physical confrontation
- Stepfather present (previous family breakdown)
- Angry temperament
- Low level of moral development
- Low empathy for others
- Parental violence to young person
- Low intellectual ability
- Preference for violent films
- Young person violent to parents
- Young person witness to spouse violence
- Favourite actor plays violent roles
- Identification with so-called bad guy in film
- Critical of film without sufficient violent action
- Poor reading ability
- Violent reason for remembering actor in film

The British government-sponsored study[75,76,84] investigated the relation between media violence and crime in 82 young offenders and 40 non-offenders. By contrast with a previous English study of young offenders and non-offenders in a community sample,[85] this investigation of offenders in secure environments showed that they self-reported spending more time than non-offenders watching satellite, television, and video films. Additionally, they reported higher preferences for violent films and identified with violent role models. Significant differences were also evident on psychometric measures, with offenders demonstrating less empathy and moral development, and more aggressive temperaments and distorted perceptions about violence than did non-offenders. This fact is consistent with the generalised aggression model[71] and other published work on how young offenders differ from their non-offending peer group.[86,87] Hence, what offenders understand from film might be very different from non-offenders. Indeed, evidence during film viewing showed that offenders were more approving of and more interested in violent scenes than non-offenders,[84] and 10 months after viewing the violent film twice as many offenders as non-offenders recalled and identified with vindictively violent characters.[75,76] This finding is consistent with a US study that showed that aggressive adolescents preferentially selected violent media (ie, viewing violent action films, playing violent computer and video games, and visiting internet sites containing violent imagery), which in turn also predicted their aggressive behaviour.[53]

A model suggesting that individuals from violent backgrounds are more likely to have distorted ideas about physical confrontation, be more prone to offending behaviour, and have a preference for media violence can be proposed.[48] In turn, these factors could

reinforce ideas about physical confrontation. The model could also incorporate the findings from psychometric measures, which show that this cycle might be assisted by aggressive temperament and inhibited by low moral values and empathy for others (figure). Overall, research suggests that particular attention should be paid to susceptible groups. Some believe that young offenders with a predisposition to antisocial acts should not be allowed to watch violent material in secure institutions.[88] For those individuals without a predisposition to aggression, violent images might be less likely to cause aggression. Nevertheless, non-violent individuals could become desensitised to, or even fearful of, violent imagery.[89]

Public-health interventions: from censorship to education

There is evidence that violence in the media has now become more acceptable to policy makers and the public, with more explicit violent imagery than ever before.[90,91] Some reviews on the effects of media violence on children and adolescents have emphasised fear as an outcome, as well as aggression.[92–94] For young children, this association is especially relevant to news programmes depicting disasters such as the terrorist attacks on the World Trade Center on Sept 11, 2001. The availability of video film, satellite, and cable TV in the home allows children to access violent media inappropriate to their age, developmental stage, and mental health. Parents and caregivers might be recommended to exercise the same care with adult media entertainment as they do with medication and chemicals around the home. Carelessness with material that contains extreme violent and sexual imagery might even be regarded as a form of emotional child maltreatment. The need for parental control is exemplified by the fact that about one in four 15-year old US teenagers had seen the controversial violent action film *Natural born killers*, which was certified for over-18s only.[95] In the UK, 45% of young people under age 18 years had seen an 18 certificate film.[85] They were able to do so because controls over age restriction in the home are more difficult to implement than in the cinema and rely on the concerns of adults in the family home and those of neighbours and friends to censor adult television, videos, and DVDs (digital versatile disk). Images on videos and DVDs can be replayed in slow motion and freeze-framed, allowing the child to repeat the experience. When these images are violent, there is a greater potential for effect than that when watching images in real time in the cinema. American parents prefer categorisations related to content rather than age when selecting an appropriate film for their children.[96] In fact, age ratings have little effect on children over 10 years of age.[96] Nevertheless, the proliferation of the internet, interactive video, and computer games containing violence limits the effectiveness of parental
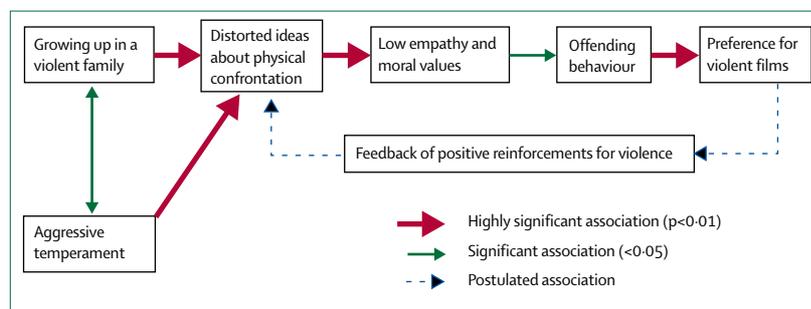

Figure: Browne and Pennell model for the development of preferences for violent films[48]

control. Although computer games are subject to the same controls as film and video and are certified when sold, software is freely available to everyone on the internet to upgrade violent imagery and interactive effects. Notably, even those parents who monitor their child watching videos or DVDs are less likely to monitor the child using video and computer games.[13]

Digital technology has made control by censorship and late broadcasting meaningless. The V-chip inserted into all USA televisions sold from the end of 1999 was an attempt to address this issue. Being no more than an electronic selection and category system, the chip was criticised for having the same limitations as film classifications, and it can easily be overridden or ignored by technology-literate children.[93] Thus, there is an urgent need for parents and policy makers to take an educational rather than censorial approach. Parents and teachers can view violent material with children and help them critically appraise what they see, in terms of its realism, justification, and consequences. In this way, caregivers can reduce the effect of violent imagery;[97–99] organisations such as UNESCO have provided public information on this topic.[8,100] An alternative approach is to educate film-makers and producers of violent media who fear a loss of revenue by reducing violent imagery. Research does not support this theory of lost revenue because it has shown that reducing violence heightened enjoyment for women and there was no change in enjoyment for men.[101] Producers also need to recognise the potential effects of their violent images on vulnerable audiences who might not have the capacity or the will to see the violence in the context of the story. Overall, several public-health recommendations (supported by the published work reviewed) can be made in relation to reducing the effects of media violence on children and adolescents.[5,22] (see panel 3).

Future directions of research

With the advent of the internet and the worldwide web, much of the imagery that traditionally causes concern to parents, professionals, and policy makers is freely accessible on websites.[102] Furthermore, many computer games use violent imagery as entertainment. There is an urgent need to understand the short-term and long-term

Panel 3: **Public-health recommendations to reduce effects of media violence on children and adolescents**

Parents should:
- be made aware of the risks associated with children viewing violent imagery as it promotes aggressive attitudes, antisocial behaviour, fear, and desensitisation
- review the nature, extent, and context of violence in media available to their children before viewing
- assist children's understanding of violent imagery appropriate to their developmental level

Professionals should:
- offer support and advice to parents who allow their children unsupervised access to inappropriate extreme violent imagery as this could be seen as a form of emotional abuse and neglect
- educate all young people in critical film appraisal, in terms of realism, justification, and consequences
- exercise greater control over access to inappropriate violent media entertainment for young people in secure institutions
- use violent film material in anger management programmes under guidance

Media producers should:
- reduce violent content and promote antiviolence themes and publicity campaigns
- ensure that when violence is presented it is in context and associated with remorse, criticism, and penalty
- ensure that violent action is not justified or its consequences understated

Policy makers:
- should monitor the nature, extent, and context of violence in all forms of media and implement appropriate guidelines, standards, and penalties
- should ensure that education in media awareness is a priority and a part of the school curricula

effects of such imagery on the individual for both passive viewing and active participation. Since most research up to now has investigated the passive effects of viewing television and film violence, research in this area has fallen behind advances in technology (such as virtual reality).[40] The generalised aggression model suggests that violent video and computer games heighten the possibility of violent thoughts, feelings, and physiological arousal in the short-term, and aggressive beliefs, attitudes, violent schema, and behavioural patterns in the long-term.[44,71] Despite the view that there is now "unequivocal evidence that media violence increases the likelihood of aggressive and violent behaviour in both immediate and long-term contexts",[103] these assertions need confirmation with prospective longitudinal research studies of vulnerable and non-vulnerable groups.

The generalised aggression model and some empirical research also suggest that individuals from violent backgrounds and those predisposed to aggressive behaviour might be more susceptible than others are to the effect of watching and interacting with violent images. Thus, this line of inquiry should be developed to consider the effects of mental health problems and the effects of viewing violent media under the influence of alcohol or drugs as state-dependent learning. The effect of media violence on vulnerable female viewers has been a neglected area of research.

However, investigators acknowledge that methodological problems in media research include the difficulty of controlling for people exposed to many media sources containing violent imagery at any one time, making it difficult to establish causal links between one media influence and changes in attitude and behaviour.[104] Future investigations need to include viewer interpretation variables to assess individual differences and distorted ideas about conflict resolution,[105] because cognitive distortions are frequently associated with violent people.[106] In particular, population studies with large samples are needed to investigate the validity of the viewpoint that violence in the media leads to violent criminal behaviour.

Conclusion

From a public-health perspective, there is evidence that violent imagery has short-term effects on arousal, thoughts, and emotions, increasing the likelihood of aggressive or fearful behaviour. However, the evidence is less consistent for older children and teenagers. The small amount of good quality research that discusses sex differences suggests that boys are more likely to show aggression after viewing violent media than girls. Long-term outcomes for children viewing media violence are more controversial, partly because of the methodological difficulties in linking behaviour with past viewing.[107] Nevertheless, a small but significant association persists in the research,[24,25,108] with an effect size that has a substantial public-health effect. Theories of aggression used to explain these effects have predicted a stronger influence of media violence for those with a predisposition for aggressive behaviour attributable to personality (eg, temperament) or situational factors (eg, growing up in a violent family) or both. Evidence supporting this idea has been noted in quasi-experimental studies. However, there is only weak evidence from correlation studies linking media violence directly to crime.

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