Published in final edited form as:
J Psychiatr Ment Health Nurs. 2013 March ; 20(2): 156–168. doi:10.1111/j.1365-2850.2012.01902.x.

Understanding Aggressive Behavior Across the Life Span

Jianghong Liu[1], **Gary Lewis**[1], and **Lois Evans**[1]
[1]Family and Community Health Department at the University of Pennsylvania, School of Nursing

Abstract

Aggressive behavior is the observable manifestation of aggression and is often associated with developmental transitions and a range of medical and psychiatric diagnoses across the lifespan. As healthcare professionals involved in the medical and psychosocial care of patients from birth through death, nurses frequently encounter—and may serve as—both victims and perpetrators of aggressive behavior in the workplace. While the nursing literature has continually reported research on prevention and treatment approaches, less emphasis has been given to understanding the etiology, including contextual precipitants of aggressive behavior. This paper provides a brief review of the biological, social, and environmental risk factors that purportedly give rise to aggressive behavior. Further, many researchers have focused specifically on aggressive behavior in adolescence and adulthood. Less attention has been given to understanding the etiology of such behavior in young children and older adults. This paper emphasizes the unique risk factors for aggressive behavior across the developmental spectrum, including childhood, adolescence, adulthood, and late life. Appreciation of the risk factors of aggressive behavior, and, in particular, how they relate to age-specific manifestations, can aid nurses in better design and implementation of prevention and treatment programs.

Keywords

Aggression; Concept Analysis

Introduction

Background

Aggressive behavior is an associated symptom of many psychiatric disorders and can manifest throughout the life span, from attention-deficit hyperactivity disorder (ADHD) in children and adolescents, to domestic violence in adults, to dementia in older adults. While much of the aggression literature has focused on adolescents and adults, less attention has been given to understanding the etiology of aggressive behaviors across the entire developmental spectrum. The purpose of this paper is to provide an overview of the manifestation and causes of aggressive behavior across the life span as well as provide suggestions for the roles that nurses, who frequently interact with patients from all age groups, can play in preventing and intervening in aggressive behavior. Potential consequences to both the victims and aggressors are also outlined.

Aggression is a highly studied area in the psychosocial literature, particularly adolescent aggression and developmental theories, adult aggression and violence, aggression and

Contact information: Jianghong Liu, PhD, Associate Professor, School of Nursing, Faculty Member of MPH, School of Medicine, University of Pennsylvania, 418 Curie Blvd., Room 426, Claire M. Fagin Hall, Philadelphia, Pennsylvania 19104-6096, Tel: (215) 898-8293, jhliu@nursing.upenn.edu.

No conflicts of interest have been declared by the authors.

criminal behavior, and psychopathology. These discussions have been detailed elsewhere (Card, Stucky, Sawalani, & Little, 2008; Kempes, Matthys, de Vries, & van Engeland, 2005; Liu & Wuerker, 2005; Loeber & Hay, 1997; Stoff & Cairns, 1996). This paper is intended to provide a basic overview of aggressive behavior and its presentation and risk factors in major age groups so as to facilitate nurses and nursing researchers in better understanding, identifying, preventing, and treating this phenomenon. In doing so, we provide a model for anticipating, responding to, and preventing aggressive behavior across the age spectrum.

Definitions and Importance

Although interrelated, it is important to differentiate between the concepts of aggression, aggressive behavior, and violence (Liu, 2004a). Aggressive behavior can be conceptualized as the observable manifestation of aggression, which is defined as any act intended to cause harm, pain, or injury in another (Zirpoli, 2008). It is important to note that although aggressive behavior and violence are often thought of as synonymous, they are not. Violence is a form of physical assault, whereas aggressive behavior is a broader construct that includes physical, verbal, psychological, and other means of causing harm, i.e. violence is but one form of aggressive behavior. Therefore, aggressive behavior does not necessarily include a physical component. This distinction is important because, although understanding aggressive behavior as a correlate or predictor of violence is informative, non-violent aggressive behavior can still lead to negative outcomes and is equally deserving of attention. The study of aggressive behavior is important to the healthcare field due to the wide range of possible negative public health outcomes, including youth violence, increased medical resource use (e.g., emergency department, psychiatric, and critical care) and economic costs, and greater involvement in the criminal justice system (Bastiaens & Bastiaens, 2006; Liu, 2004). A 2002 report from the World Health Organization found that 4,400 people die each year due to acts of violence (Krug et al., 2002), underscoring the public health relevance of understanding and preventing aggressive behavior.

Aggressive Behavior and the Nursing Profession

The study of aggressive behavior is particularly relevant to the nursing profession. Since the pioneering days of Florence Nightingale, the work of nurses has evolved to often directly involve many forms of aggressive behavior, such as the identification of child abuse, the treatment of victims of aggressive behavior in the emergency department, as well as the emotional and psychological care of sexual assault and rape victims. Workplace violence is also a well-documented phenomenon in healthcare settings, with physicians and nurses often the recipients and/or perpetrators (Duhart, 2001; Gillespie, Gates, Miller, & Howard, 2010). Some studies have shown an increase of violence toward women in the healthcare field (Gillespie et al., 2010), making nurses especially vulnerable.

Nursing involves the physical and emotional care of individuals who may be momentarily unstable both physiologically and psychologically, therefore the work of nurses in administering care often causes pain and discomfort to the patient. The nature of nurses' roles increases their likelihood of being threatened, verbally abused, or even physically assaulted while providing care. Nurses play an important role in assessing, preventing, and treating aggressive behavior among patients and families. For example, nurses develop and administer psychiatric assessment and diagnostic instruments that can help detect the propensity toward aggressive behavior or related symptoms (e.g., emotional dysregulation), directly care for victims of aggressive behavior, and provide an environment that is safe and deliberately non-precipitating of aggressive behavior.

The debate over the risk factors for aggressive behavior centers on whether it results more from psychosocial factors (e.g., parenting style, emotional trauma) or biological factors

(e.g., genetics, exposure to toxic chemicals). However, a common theme among all age groups appears to be the brain. For example, in children, the brain is not fully developed and is highly vulnerable to effects from negative stimuli (toxins, emotional trauma, etc.). In older adults, degeneration of the brain (from drugs, injury, or disease) may be a risk factor for aggressive behavior. Given that nurses are involved in caring for patients across the life span, the ongoing dialogue about aggressive behavior, its etiologic and precipitating factors, as well as developmental manifestations is highly relevant in identifying, preventing, and treating symptoms. One of the unique characteristics of aggressive behavior that can make detection and treatment difficult is the variety of ways it can manifest across a person's life span. In working with children and adolescents, nurses may be a part of the first-line of defense to help break this pattern and reduce aggressive behavior in later life (Liu, 2004a; Liu & Wuerker 2005). We will explore the course of aggressive behavior throughout the life span below.

Manifestations of Aggressive Behavior across the Lifespan

Toddlers & Preschoolers

Aggressive behavior during childhood is seen as a part of the normal developmental process (Greydanus, Pratt, Greydanus, & Hoffman, 1992). Before children develop verbal skills, aggressive behavior is manifested physically. Later on, verbal skills can be used for aggressive purposes, but also to diffuse aggressive behavior by communicating needs that could not be expressed physically (Ferris & Grisso, 1996). Toddlers display aggressive behavior by crying, screaming, biting, kicking, throwing, and breaking objects (Achenbach, 1994; Raine, Reynolds, Venebles, Mednick, & Farrington, 1998). Anger outbursts typically peak at 18 to 24 months and slowly decrease by age 5. It was found that the majority of children first reached the onset of aggressive behavior before age 2, at around 17 months of age (Hay, Castle, & Davies, 2000; Keenan & Wakschlag, 2000; Tremblay et al. 1996). In addition, in children with developmental delay, a higher rate of aggressive behavior and other externalizing behavior problems was found (Baker et al., 2003).

School-Age Children

As children mature and enter school, they may continue to display many of the same aggressive behaviors (e.g., crying, screaming, biting, kicking, throwing, and breaking objects) as during pre-school years. As these school-age children begin to have more social interactions and develop more relationships, however, aggressive behavior towards peers may appear (Greydanus et al., 1992). In addition, behaviors such as teasing, irritability, bullying, fighting, and even cruelty to animals or fire-setting may be seen. Maternal reports of physical aggression between the ages of 2 and 11 years, however, suggest that aggressive behavior may actually decrease over time (Tremblay et al., 1996). The same study found an increase in reports of indirect aggressive behavior from ages 4 to 11 years. This may be due to children's increased use of verbal skills and a larger number social relationships and interactions during this timeframe. Although school-age children may display aggressive behavior, multiple studies have found no evidence of the onset of physical aggression in children after the age of 6 years (Broidy et al., 1999; Nagin & Tremblay, 1999). This suggests that, for school-age children, aggressive behavior displayed at this developmental stage is carried over from earlier ages, but does not begin during this stage.

Adolescents

Moving forward, more serious aggressive behavior and even violence often appear during adolescence, resulting in an increase in injury or death, partly due to greater likelihood of weapon use (Berkowitz, 1993; Reiss & Roth, 1993). Early violence involves use of knives, with gun use increasing in the later years of adolescence. The increase in bodily strength and

adoption of weapons may also empower adolescents to display a greater propensity towards directing aggressive behavior at authority figures (Callahan & Rivara, 1992; Johnston, O'Malley, & Bachman, 1993). Usually, adolescent aggressive behavior occurs in groups, including gang activities such as stealing or truancy (Lopez & Emmer, 2002). Peer relationships appear to play an important role in adolescent aggressive behavior. Displaying aggressive behavior may be a way to gain popularity or high social status by demonstrating power or control. Peer pressure may lead to displays of aggressive behavior out of fear of isolation or loss of social standing (Lopez & Emmer, 2002).

There is also an increase in aggressive behavior between girls and boys as cross-gender peer relationships develop. As dating begins, aggressive behavior between genders increases and may include violent forms of aggressive behavior, like date rape and sexual assault. In addition, some adolescents may have partners and parent children, bringing the possibility of aggressive behavior manifested as child abuse or domestic violence. Many researchers have identified adolescent aggressive behavior as an important public health concern (Brener, Simon, Krug, & Lowry, 1999; Krug et al., 2002; Lowry, Powell, Kahn, Collins, & Kolbe, 1998). A cross-national study by the World Health Organization (WHO) using the Health Behaviour in School-Aged Children (HBSC) survey was conducted to compare the prevalence of violence across 35 nations (Pickett et al., 2005). Out of 161,082 student respondents, involvement in fighting per country ranged from 37–69% for boys and 13–32% for girls (Pickett et al., 2005). In addition, the prevalence of weapon-carrying varied from 10–21% for boys and 2–5% for girls (Pickett et al., 2005).

There is a subset of aggressive behavior in adolescents, however, that appears in adolescence and then disappears in early adulthood. It has been termed *adolescence-limited antisocial behavior* (Moffitt & Caspi, 2001). In this case, previously healthy and normal youngsters engage in delinquent behavior during adolescence, but discontinue such behaviors upon entering adulthood. In this scenario, youngsters exhibiting adolescence-limited antisocial behavior are relatively common, temporary, and practically normative (Moffitt & Caspi, 2001).

Adults

From adolescence to adulthood, aggressive behavior may escalate into more serious and violent acts, such as domestic violence, sexual abuse, child abuse, and homicide. Young adults (ages 18–24 years) are reported to have the highest homicide rate (U.S. Department of Justice, 2007). In 2009, the number of violent crime cases was 1,251,617, down 5.4% from 2008 and the number of homicides decreased 7.1% over the same time period to 14,558 (U.S. Department of Justice, 2009). Although this recent trend is encouraging, aggressive behavior and violence are still serious issues for adults.

Child abuse is another important issue relevant to adult aggressive behavior. In 2008, according to a report on child maltreatment (defined as an act or failure to act which results in death, serious physical or emotional harm, sexual abuse, or exploitation), the rate of children who were subject to neglect or abuse was 1.03% (U.S. Department of Health & Human Services, 2008). Of these children, 28.9% were victims of physical, sexual, or psychological abuse (U.S. Department of Health & Human Services, 2008).

Spousal abuse is a concern among adults, not only for the physical toll it can take but also for the emotional trauma involved. Although both genders can commit spousal abuse, men are responsible for a majority of incidents. For instance, 7.7% of all women in the United States reported being the victim of sexual violence, and about 22% of women were physically assaulted by a male partner at some point in their lives (Krug et al., 2002).

Because nurses are the primary caregivers to these victims, they are active in helping them recover physically and emotionally.

A unique subset of excessive aggressive behavior in adults is road rage. Although not directly classified in the DSM-IV, it can fall under the category of Intermittent Explosive Disorder. Road rage can describe any displays of anger while driving, although such displays are also referred to as “angry or aggressive driving” (Sharkin, 2004). Both aggressive driving and violent driving incidents have increased (Dukes, Clayton, Jenkins, Miller, & Rodgers, 2001). Age is the most important factor in aggressive driving incidents, with the majority of aggressive drivers being men between 18–26 years of age (Dukes et al., 2001). Some factors that may play a role include situational/environmental conditions (traffic, congestion, etc.), personality factors, or demographic variables (Sharkin, 2004).

Older Adults

As adults grow older, new situations come into play. Much of the research on aggressive behavior in older adults has been conducted on residents in nursing homes, likely due to the high prevalence of dementias in these populations. Aggressive behavior in nursing home residents may be directed towards other residents or caregivers (Rosen et al., 2008; Zeller et al., 2009). Aggressive behavior directed toward caregivers or healthcare professionals tends to be precipitated by personal care-related events. Specifically, aiding with showers, baths, and toileting may be perceived by the patient as a violation of personal space and body (Zeller et al., 2009). Behavioral disturbance is a common feature in dementia, often due to cognitive impairment, aphasia, agnosia, brain damage resulting in loss of inhibition and emotional dysregulation, and psychosocial difficulties. Patients experiencing difficulty verbally communicating their needs may display aggressive behaviors; thus, aggressive behavior may serve to protect themselves against actions they misperceive as threats (Talerico & Evans, 2000).

A more serious form of aggressive behavior seen in older adults is homicide-suicide. Data suggests that the annual incidence of homicide-suicide is higher in adults 55 years and older compared to those younger than 55 years, with males more likely to perpetrate it than females (Cohen, Llorente, & Eisdorfer, 1998; Malphurs & Cohen, 2005). Homicide-suicide more typically occurs among couples than among unrelated individuals. Suicide, which may be conceptualized as a form of self-directed aggressive behavior, is disproportionately higher in geriatric populations than non-geriatric populations in the U.S. From 2000–2006, the rate of suicide among adults aged 65 years and older was 0.0148%, compared to a general population rate of 0.0109% (Centers for Disease Control & Prevention, 2009). Completed suicides among older Caucasian males are especially high, as much as five times greater than the national average (Conwell, Duberstein, & Caine 2002).

Risk Factors for Aggressive Behavior Across the Lifespan

Clearly, aggressive behavior can vary a great deal over the course of an individual’s life. Research suggests that this aggressive behavior develops as one of two types: that which emerges in childhood and progresses into adolescence and adulthood, and that which develops after childhood, often due to physical or emotional trauma, substance use, medical illness or brain injury. A summary of developmental-specific risk factors can be found in Table 1.

Aggressive Behaviors Emerging During Childhood

Many theories about the emergence of aggressive behavior during childhood have also been posited to explain the occurrence of aggressive behavior in adolescents and adults. The social learning theory, which postulates that individuals learn aggressive behavior by

observing others' behavior, may explain aggressive behavior in children as well as other age groups. By observing aggressive behavior and its effect on obtaining a potential reward (e.g., resolution of a conflict, obtaining what they want), an individual may use similar behavior when confronted with a similar problem. In children, this is supported by evidence that exposure to family violence is often associated with displays of aggressive behavior among the children in that family (Herrera & McCloskey, 2003; Litrownik, Newton, Hunter, English, & Everson, 2003). Concern that media influences, such as violence in television or film, may be linked with increased aggressive behavior in individuals who watch those programs has found support in children specifically through use of longitudinal data (Huesmann, Moise-Titus, Podolski, & Eron, 2003). Another model, the social information processing (SIP) theory, proposes that people develop aggressive behavior after repeated exposure to specific social stimuli. For example, proactive aggression may occur after having received a reward following aggressive behavior. Furthermore, SIP posits that individuals who display aggressive behavior may be prone to misattributing motives, behaviors, and social cues, resulting in reactive aggression. Two studies found an increase in aggression scores in children with autism spectrum disorders (Dominick, Davis, Lainhart, Tager-Flusberg, & Folstein, 2007; Hartley, Sikora, & McCoy, 2008). SIP theory may partly explain this finding.

More specific to the development of aggressive behavior in childhood is the question of "nature versus nurture," which weighs whether and how much genetic/biological factors versus environmental factors contribute to aggressive behavior development. Some studies have found that psychosocial environmental factors, such as poor parental rearing, have a strong association with aggressive behavior in children (Blanz, Schmidt, & Esser; 1991; Deater-Deckard, Dodge, Bates, & Pettit, 1998; Fergusson, Horwood, & Lynskey; 1996, Liu, Cheng, & Leung, 2010), while others suggest a genetic basis for aggressive behavior (Baker, Raine, Liu, & Jacobson, 2008; Edelbrock, Rende, Plomin, & Thompson, 1995; Miles & Carey, 1997). Still others yield inconclusive results about the effect of genetics. It is likely that both genetics and environment are involved in the development of aggressive behavior in children. Increased exposure to air pollution or certain chemicals prenatally has been linked to increased aggressive behavior (Evans & Kantrowitz, 2002; Williams & Ross, 2007). Individuals displaying aggressive and/or violent behavior often have abnormal clinical findings on neurological examinations, EEG studies, and brain imaging scans (Raine, 2002; Raine, Lencz, Nihrle, LaCasse, & Colletti, 2000; Stoff & Cairns, 1996). Aggressive behavior may also be comorbid with impulsive behavior or attention deficit hyperactivity disorder (ADHD) (Hagerman, 1999). Furthermore, neurotransmitters may be an issue, as augmentation of serotonin was recently found to decrease aggressive behavior (Berman, McCloskey, Fanning, Schumacher, & Coccaro, 2009). Serotonin is a neurotransmitter found throughout the body, including the central nervous system (CNS) where it is thought to contribute to the feelings of happiness and well-being (Young, 2007). Sex hormones may be involved in the biological model of etiology. So-called "roid rage," which attributes aggressive behavior to taking anabolic steroids has received significant attention in the popular media. A randomized controlled trial found that men who received testosterone injections had increased ratings of manic symptoms (Pope, Kouri, & Hudson, 2000).

Health risk factors should not be overlooked (Liu, in press). For example, birth complications (e.g., anoxia, forceps delivery, etc.), in combination with other risk factors like poor parenting and disadvantaged family environment, are associated with the development of aggressive behaviors in childhood (Aresenault, Tremblay, Boulerice, & Saucier 2002; Hodgins, Kratzer, & McNeil, 2001, Liu & Wuerker, 2005). It is possible that birth complications may result in central nervous system damage, impairing proper brain function (Liu, Raine, Wuerker, Venables, & Mednick, 2009). Additionally, deficiencies in

specific nutrients may hinder brain growth and development, potentially predisposing malnourished children to behavioral disturbance (Liu, Raine, Venables, Dalais, & Mednick, 2004). Tremblay (2010) notes the benefit of longitudinal studies, which may facilitate clarifying the complex interaction between genes and environmental factors. In the absence of such data, methods to prevent or treat aggressive behaviors may appear before the mechanisms are firmly determined (Tremblay, 2010).

Aggressive Behavior Emerging in Adolescents, Adults, and Older Adults

Aggressive behavior may also appear for the first time in adolescents, adults, or older adults. Aggressive behavior emerging after childhood may be conceptualized using similar theoretical approaches as in childhood aggression, such as the social learning theory or SIP theory. Aggressive behavior, however, that appears later in life may also be associated with increased substance abuse. Aggressive behavior may be used to obtain money to purchase substances or while under the influence of substances. Illicit drug use was found to be associated with increases in violence and violence-related injuries (Baskin-Sommers & Sommers, 2006; Vitale & de Mheen, 2006;).

Of the substances linked to aggressive behavior, alcohol appears particularly noxious. Alcohol is linked with violence including intimate partner violence (Bye, 2007; Lipsky, Caetano, Field, & Larkin, 2005). For example, alcohol was present in 63% of partner violence incidents, 39–45% of murders, 32–40% of sexual assaults, and 45–46% of physical assaults (Greenfeld & Henneberg, 2001). Level of intoxication may also contribute. Individuals involved in incidents of severe aggressive behavior may be more intoxicated that individuals involved in less severe incidents (Graham & Wells, 2001). Alcohol, however, has not been conclusively shown to cause aggressive behavior. Alcohol may interfere with self-control. Or perhaps individuals who use aggressive behaviors consume alcohol more frequently than people who do not.

Recent data has examined the impact of traumatic brain injury (TBI) and an increased likelihood to develop aggressive behavior following childhood. For example, aggressive behavior was a prevalent symptom of TBI (Baguley, Cooper, & Felmingham, 2006; Cole et al., 2008; Tateno, Jorge, & Robinson, 2003). The initial injury may damage areas in the brain responsible for managing aggression and impulse control, particularly the frontal lobes (Tateno et al., 2003). It is not known, however, whether TBI may have other effects resulting in aggressive behavior that brain scans may not detect.

The onset of dementia may contribute to the manifestation of aggressive behavior in older adults due to decrements in intellectual functioning, memory, and reasoning (Brodaty & Low, 2003; Patel & Hope, 2004). Further, patients with neurodegenerative diseases may suffer from delusions or hallucinations, making aggressive behavior more likely when they misperceive a threat (Aarsland & Cummings, 1996; Patel & Hope, 2004). Kunik and colleagues (2010) detailed aggressive behavior risk factors in persons with dementia and found depression, physical pain, and poor interrelationships between the patient and caregiver significantly associated with greater incidence of aggressive behavior. Other disorders associated with aggressive behavior are bipolar disorder, depression, and post-traumatic stress disorder (Garno, Gunawardane, & Goldberg, 2008; Latalova, 2009; McGirr & Turecki, 2007; Taft, Vogt, Marshall, Panuzio, & Niles, 2007; Taten et al., 2010; Treuting & Hinshaw, 2001). These associations not only apply to older adults but to all adults in general. For those with bipolar disorder, which is characterized by alternating episodes of mania or depression, aggressive behavior may occur during mania. In patients with depression or in a depression episode of bipolar disorder, self-directed aggression may manifest. Post-traumatic stress disorder often results from psychological trauma and affects

the individual's ability to cope with anxiety. Aggression against others may serve as a way to deal with the stress.

It is unclear if a causal relationship exists. Aggressive behavior in older populations has been associated with premorbid personality dysfunction, illness progression, verbal communication impairments, and misattributions of behaviors from caregivers (e.g., perceiving acts of personal care, such as hygiene, as threats) (Pulsford & Duxbury, 2006; Rayner, O'Brien, & Schoenbachler, 2006; Shub, Ball, Abbas, Gottumukkala, & Kunik 2010; Talerico, Evans & Strumpf, 2002). In addition, although the reasons behind homicide-suicide are often unclear, a number of factors may contribute. For example, the perpetrator was more likely a caregiver for the victim (Malphurs & Cohen, 2005). Similarly, the perpetrator more likely had a history of domestic violence (Malphurs & Cohen, 2005). Other factors include marital and family conflict, pending separation, and life-event stressors (Cohen, 2000; Malphurs, Eisdorfer, & Cohen, 2001; Rosenbaum, 1990). In some instances caregivers recognize their own failing health and do not want to leave the spouses unattended. For example, increased dependency of the care-recipient and greater functional impairment of the caregiver can increase strain and burden which is associated with increased depression symptoms (Schulz & Beach, 1999).

Finally, risk factors for suicide among older adults are well researched and generally considered complex due to the multiplicative effects of physical and mental disabilities that are increasingly common in late life. Psychiatric disorders, including major depression and psychotic illness, significant physical illness, perceived burdensomeness, lack of social support, and living alone all appear to significantly increase the risk of suicide in this population (Garand, Mitchell, Dietrick, Hijjawi, & Pan, 2006; Jahn, Cukrowicz, Linton, & Prabhu, 2010; Mitty & Flores, 2008). This complexity may make it difficult to implement prevention plans.

Consequences of Aggressive Behavior

After it appears, aggressive behavior can have profound health and psychosocial effects on the perpetrator, victim, as well as bystanders. Children exposed to family violence may be more likely to express problem behaviors themselves (Litrownik et al., 2003, Liu, 2004b). Infants who live in families that experience aggressive behavior and violence may suffer from irritability, sleep disturbances, emotional distress, and somatic complaints (Osofsky & Scheeringa, 1997; Zeanah & Scheeringa, 1997). Children living in homes with handguns are differentially at risk for increased injury or death than children not living in homes with firearms (Richmond, Schwab, & Branas, 2002). Additionally, when children enter school, exposure to violence may result in misattribution biases toward inferring negative intent from neutral or unclear social cues, which can impair one's ability to form healthy, functional relationships (Dodge, Pettit, & Bates, 1998).

As aggressive children grow older and enter adolescence, they become at greater risk for anxiety, depression, and suicidal behavior (Brown & Finkelfor, 1986; Lewis, 1992; Rosenberg & Rossman, 1998). Aggressive behavior casts a notable economic toll (Barling, Rogers, & Kelloway, 2001; O'Leary-Kelly, Griffin, & Glew, 1996; Schat & Kelloway, 2000). The total financial cost of violence in the United States was estimated to be $70 billion per year, with $64.4 billion in lost productivity and $5.6 billion in medical care (Corso, Mercy, Simon, Finkelstein, & Miller, 2007). While victims of aggressive behavior are at risk for psychological and emotional traumatic reactions as well as psychiatric disorders, such as panic attacks, phobias, and depression, aggressors also face negative consequences. This includes increased risk of legal punishment and, in some cases,

imprisonment. In turn, the violent nature of the prison environment often further reinforces aggressive behavior in the offender, perpetuating a cycle that can be difficult to break.

Prevention and Intervention: A Three-Pronged Approach

Due to these significant consequences of aggressive behavior, steps for prevention and treatment must be taken to mitigate these harmful effects. Understanding the risk factors for aggressive behavior is vital to effective prevention and intervention. Many psychological treatments for aggressive behavior have been included as part of larger interventions for anger. While anger does not always lead to aggressive behavior, anger management interventions often focus on reducing aggressive behavior as an important outcome of interest. Effective techniques supported by the literature include cognitive/skill-training components (e.g., identifying and correcting misattributions; reframing negative cognitions into more neutral or positive cognitions; using forethought and planning behaviors rather than acting impulsively; developing problem solving skills; using perspective-taking to consider others' views; self-monitoring to increase awareness of one's emotions and potential reactions) as well as behavioral components (e.g., finding non-aggressive means for communicating; non-aggressive methods of diffusing anger, emoting and venting frustrations; using relaxation techniques) (Chemtob, Novaco, Hamada, & Gross, 1997; Deffenbacher, Dahlen, Lynch, Morris, & Gowensmith, 2000; Deffenbacher & McKay, 2000; Del Vecchio & O'Leary, 2004). Pharmacologic treatments with documented efficacy in children and adult populations include mood stabilizers, antipsychotics, selective serotonin reuptake inhibitors, beta blockers, and anticonvulsants (Coccaro & Siever, 2002; Findling, 2003).

We recommend a three-pronged approach for the prevention and intervention of aggressive and violent behavior. The first involves the use of primary prevention programs focusing on the prenatal and perinatal periods of birth. Prenatal nurses and nurse midwifes can provide good prenatal care and screen for risk factors. In addition, they can educate mothers on proper prenatal care, including the importance of nutrition and the avoidance of smoking, drinking, or other harmful activities. For instance, supplementation with different nutrients or micronutrients (e.g., thiamine, lithium, and tryptophan) has been shown to lead to decreased aggressive behavior (Werbach, 1992). Postpartum nurses can instruct parents about proper parenting skills and the importance of breastfeeding. However, there is conflicting evidence about whether breastfeeding protects against behavior problems or not (Kramer, 2010; Kramer et al., 2008; Oddy et al., 2010).

The second approach could target prevention efforts toward vulnerable populations, such as pregnant teenagers and at-risk families (e.g., those with a history of violence). Again, patient education about the damage of prenatal smoking or drinking may be beneficial. School nurses can monitor child growth and development. Additionally, they can work with teachers to detect the warning signs of aggressive behavior and explain emotion management techniques. School nurses can also instruct nurses about different techniques to reduce aggressive behavior in children and adolescents that already exhibit it. For example, massage therapy helped decrease aggressive behavior in preschool children (von Knorring, Soderberg, Austin, & Uvnas-Moberg, 2008). Separate case reports have suggested that meditation, relaxation breathing exercises, and music therapy could be effective in lessening aggressive behavior (Birnbaum, 2005; Gaines and Barry, 2008; Rickson and Watkins, 2003). However, in-classroom use of restraints was not found helpful, as it actually increased problem behaviors (Magee and Ellis, 2001).

Community health and public health nurses can help at-risk families through enrollment in school-based or community-based prevention programs or family-strengthening programs,

which have been shown to be effective (Fields & McNamara, 2003; Kumpfer & Alvarado, 2003; Mytton, DiGuiseppi, Gough, Taylor, & Logan, 2006). The Head Start program, when incorporating an emotion-based prevention program, led to increases in emotion knowledge and regulation and decreases in aggressive behavior, negative emotion expressions, and negative peer and adult interactions (Izard et al., 2008). As demonstrated by Olds and colleagues (1998), nurses can be directly involved in prevention through home-based nursing visits early in childhood, which may lead to reduced aggressive behavior later. In addition, removing guns and other weapons in the home could improve safety and prevent violence from occurring.

Finally, the third approach involves the actual treatment of those individuals that develop aggressive behavior. Psychiatric nurses are very involved in the traditional methods of intervention, such as psychotherapy or psychopharmacology. Cognitive behavioral therapy (CBT) attempts to address dysfunctional emotional, behavioral, and cognitive problems by helping patients adopt healthier behaviors and thinking patterns. Studies have shown the effectiveness of CBT in reducing anger and aggressive behavior in children, adolescents, and adults (Beck & Fernandez, 1998; Rowand, Smith, Miller, & Brownell, 1999; Sukhodolsky, Kassinove, & Gorman, 2004). In the treatment of older adults, geriatric nurses need to be aware of the special issues involved. Care must be taken when attending to patients with dementia, who might perceive care as a threat. A person-centered approach has been effective in decreasing aggressive behavior in dementia patients (Enmarker, Olsen, & Hellzen, 2011). The treatment of behavioral disturbances, including aggressive behavior, in patients with dementia often involves pharmacotherapy with atypical antipsychotic medications. Equivalent non-pharmacological treatments may include behavior modification techniques to help patients learn non-aggressive strategies for communicating. Observing early interactions that escalate to aggressive behavior in a person of risk can also be important. A study by Landreville and colleagues (2006) reviewed the effectiveness of different non-pharmacological techniques. Special staff training, removal of negative stimuli, structured activities, and special care units showed some effectiveness in reducing aggressive behavior (Landreville et al., 2006). Although these programs may not work in all situations, nurses can experiment with them to see which initiatives are effective for individual patients. Overall, in the care of older adults, nurses and caregivers must explore the needs of their patients by open communication between the caregivers, patients, and their family members.

Nurses may be particularly effective in the implementation of these behavioral strategies as they have continual contact with patients and are involved with care giving throughout the patient's day. Nurses are important for risk assessment, as they have the opportunity to predict whether future aggression is likely based on past behaviors (Irwin, 2006). Not only are nurses likely to be very familiar with a patient's given "triggers" for aggressive behavior, their ongoing involvement with patients means they have ample opportunities to teach skill-building for reducing aggressive behavior. For the actual treatment of aggressive behavior, medication is an effective tool. For inpatients, the quality of the nurse-patient relationship appears to be the most significant determinant of whether patients decide to take their medications (Irwin, 2006). Therefore, nurses have an important part to play in prevention, risk assessment, and treatment of aggressive behavior.

Conclusion

The concept of aggressive behavior across the life span is very complex. An overarching theme appears to involve both risk factors that precipitate and increase the predisposition towards aggression as well as situations that actually elicit the aggression. For instance, early exposure to violence, toxin exposure, drug use, etc. may potentially be risk factors for

aggression and predispose people to behaving aggressively. However, specific situations may actually draw out that aggressive behavior. This appears to apply to all age groups. For example, in childhood, aggressive behavior may bring rewards, such material goods or control over a situation. In adolescence, aggressive behavior may result from increased peer pressure or may serve as a means to resist authority. In adulthood, increased responsibility (taking care of family or earning an income), may bring targets of aggressive behavior such as domestic violence. In older adults, invasion of personal space may trigger aggression and diminishing physical skills may be a reason to contemplate suicide. These are just some scenarios in which aggressive behavior may be drawn out. Effective prevention strategies may need to reduce risk factors as well as mitigate the ability of those situations to elicit aggression.

This is essential, because aggressive behaviors pose important individual and public health risks. As the medical caregivers who have the most interaction with aggression victims and perpetrators, nurses play a central role in the prevention and intervention of aggressive behavior. A better understanding of the etiology and meaning of aggressive behavior may lead to better treatment options and, ultimately, better outcomes. Aggressive behavior has been linked to both psychosocial and biological factors, and greater research is needed to definitively identify all of the factors that can give rise to aggressive behavior. Aggressive behavior is unique in that its causes and manifestations can vary across different age groups. Therefore, it is imperative that nurses understand these age-related differences in order to successfully tailor and develop effective prevention and intervention plans.

Acknowledgments

This study is supported, in part, by NIH/NIEHS K01-ES015 877 and R01ES018858 to the first author.

References

Aarsland D, Cummings J, Yenner G, Miller B. Relationship of aggressive behavior to other neuropsychiatric symptoms in patients with Alzheimer's disease. Am J Psychiatry. 1996; 153:243–247. [PubMed: 8561206]

Achenbach, T. Child Behavior Checklist and related instruments. In: Maruish, ME., editor. The use of psychological testing for treatment planning and outcome assessment. Hillsdale, NJ: Lawrence Erlbaum Associates; 1994. p. 517-549.

Aresenault L, Tremblay R, Boulerice B, Saucier J. Obstetrical complications and violent delinquency: Testing two developmental pathways. Child Development. 2002; 73:496–508. [PubMed: 11949905]

Baguley I, Cooper J, Felmingham K. Aggressive behavior following traumatic brain injury: how common is common? J Head Trauma Rehabil. 2006; 21(1):45. [PubMed: 16456391]

Baker B, McIntyre L, Blacher J, Crnic K, Edelbrock C, Low C. Pre-school children with and without developmental delay: behaviour problems and parenting stress over time. Journal of Intellectual Disability Research. 2003; 47:217–230. [PubMed: 12787154]

Baker LA, Raine A, Liu J, Jacobson KC. Differential genetic and environmental influences on reactive and proactive aggression in children. Journal of Abnormal Child Psychology. 2008; 36:1265–1278. [PubMed: 18615267]

Barling J, Rogers AG, Kelloway EK. Behind closed doors: In-home workers' experience of sexual harassment and workplace violence. Journal of Occupational Health Psychology. 2001; 6:255–269. [PubMed: 11482636]

Baskin-Sommers A, Sommers I. Methamphetamine use and violence among young adults. Journal of Criminal Justice. 2006; 34(6):661–674.

Bastiaens L, Bastiaens I. Youth Aggression: Economic Impact, Causes, Prevention, and Treatment. Psychiatric Times. 2006; 23(11):1–2.

Beck R, Fernandez E. Cognitive-Behavioral Therapy in the Treatment of Anger: A Meta-Analysis. Cognitive Therapy and Research. 1998; 22(1):63–74.

Berkowitz, L. Aggression: It's Causes, Consequences and Control. Philadelphia: Temple Univ. Press; 1993.

Berman M, McCloskey M, Fanning J, Schumacher J, Coccaro E. Serotonin augmentation reduces response to attack in aggressive individuals. Psychol Sci. 2009; 20(6):714–720. [PubMed: 19422623]

Birnbaum L. Adolescent aggression and differentiation of self: guided mindfulness meditation in the service of individuation. The scientific world journal. 2005; 5:478–89.

Blanz B, Schmidt MH, Esser G. Familial adversities and child psychiatric disorders. J Child Psychol Psychiatry. 1991; 32:939–950. [PubMed: 1744197]

Brener ND, Simon TR, Krug EG, Lowry R. Recent trends in violence-related behaviors among high school students in the United States. Journal of the American Medical Association. 1999; 282:440–446. [PubMed: 10442659]

Brodaty H, Low L. Aggression in the Elderly. J Clin Psychiatry. 2003; 63(Suppl 4):36–43. [PubMed: 12672263]

Broidy, L.; Brame, R.; Fergusson, D.; Dodge, K.; Laird, R.; Loeber, R.; Lynam, D.; Nagin, D.; Tremblay, R. Working Paper. Carnegie Mellon University; 1999. Trajectories of childhood problem behavior and adolescent delinquency: results from a six site international study.

Bye E. Alcohol and violence: use of possible confounders in a time-series analysis. Addiction. 2007; 102(3):369–376. [PubMed: 17298643]

Callahan C, Rivara F. Urban high school youth and handguns. J Am Med Assoc. 1992; 267:3038–42.

Card VA, Stucky BD, Sawalani GM, Little TD. Direct and Indirect Aggression During Childhood and Adolescence: A Meta-Analytic Review of Gender Differences, Intercorrelations, and Relations to Maladjustment. Child Development. 2008; 79:1185–1229. [PubMed: 18826521]

CDC. Centers for Disease Control and Prevention, National Centers for Injury Prevention and Control. Web-based Injury Statistics Query and Reporting System (WISQARS) Injury Mortality Report, 1999–2006. 2009. Retrieved from http://www.cdc.gov.lp.hscl.ufl.edu/injury/wisqars/index.html

Chemtob C, Novaco R, Hamada R, Gross D. Cognitive-behavioral treatment for severe anger in posttraumatic stress disorder. Journal of Consulting and Clinical Psychology. 1997; 65(1):184–189. [PubMed: 9103748]

Coccaro, E.; Siever, LJ. Pathophysiology and Treatment of Aggression. In: Davis, KL.; Charney, D.; Coyle, JT.; Nemeroff, C., editors. Neuropsychopharmacology: The Fifth Generation of Progress. American College of Neuropsychopharmacology; 2002.

Cohen D. Homicide–suicide in older persons. Psychiatric Times. 2000; 17:49–52.

Cohen D, Llorente M, Eisdorfer C. Homicide-Suicide in Older Persons. Am J Psychiatry. 1998; 155:390–396. [PubMed: 9501751]

Cole W, Gerring J, Gray R, Vasa R, Salorio C, Grados M, et al. Prevalence of aggressive behaviour after severe paediatric traumatic brain injury. Brain Inj. 2008; 22(12):932–939. [PubMed: 19005885]

Conwell Y, Duberstein PR, Caine ED. Risk factors for suicide in later life. Biological Psychiatry. 2002; 52(3):193–204. [PubMed: 12182926]

Corso P, Mercy J, Simon T, Finkelstein E, Miller T. Medical Costs and Productivity Losses Due to Interpersonal and Self-Directed Violence in the United States. American Journal of Preventive Medicine. 2007; 32(6):474–482. [PubMed: 17533062]

Deater-Deckard K, Dodge K, Bates J, Pettit G. Multiple risk factors in the development of externalizing behavior problems: group and individual differences. Dev Psychopathol. 1998; 10:469–493. [PubMed: 9741678]

Deffenbacher JL, Dahlen ER, Lynch RS, Morris CD, Gowensmith WN. An application of Beck's cognitive therapy to general anger reduction. Cognitive Therapy and Research. 2000; 24:689–698.

Deffenbacher, JL.; McKay, M. Overcoming Situational and General Anger: a protocol for the treatment of anger based on relaxation, cognitive restructuring, and coping skills training. Oakland, CA: New Harbinger Publications, Inc; 2000.

Del Vecchio T, O'Leary KD. Effectiveness of anger treatments for specific anger problems: a meta-analytic review. Clinical Psychology Review. 2004; 24:15–35. [PubMed: 14992805]

Dodge, K.; Pettit, G.; Bates, J. Developmental Perspectives on Trauma: Theory, Research, and Intervention (Rochester Symposium on Developmental Psychopathology//(Proceedings)). 1. Rochester: University of Rochester Press; 1998. How the experience of early physical abuse leads children to become chronically aggressive; p. 263-288.

Dominick K, Davis N, Lainhart J, Tager-Flusberg H, Folstein S. Atypical behaviors in children with autism and children with a history of language impairment. Research in Developmental Disabilities. 2007; 28(2):145–162. [PubMed: 16581226]

Duhart, D. Violence in the Workplace, 1993–99. Rockville, Md: US Dept of Justice; 2001.

Dukes R, Clayton S, Jenkins L, Miller T, Rodgers S. Effects of aggressive driving and driver characteristics on road rage. The Social Science Journal. 2001; 38(2):323–331.

Edelbrock C, Rende R, Plomin R, Thompson L. A twin study of competence and problem behavior in childhood and early adolescence. Journal of Child Psychology and Psychiatry and Allied Disciplines. 1995; 36:775–785.

Enmarker I, Olsen R, Hellzen O. Management of person with dementia with aggressive and violent behaviour: a systematic literature review. International Journal of Older People Nursing. 2011; 6:153–62. [PubMed: 21539720]

Evans G, Kantrowitz E. SOCIOECONOMIC STATUS AND HEALTH: The Potential Role of Environmental Risk Exposure. Annual Review of Public Health. 2002; 23:303–331.

Farrell G, Bobrowski C, Bobrowski P. Scoping workplace aggression in nursing: findings from an Australian study. Nursing and Healthcare Management and Policy. 2006; 55(6):778–787.

Fergusson DM, Horwood LJ, Lynskey MT. Childhood sexual abuse and psychiatric disorder in young adulthood: II. Psychiatric outcomes of childhood sexual abuse. J Am Acad Child Adolesc Psychiatry. 1996; 35:1365–1374. [PubMed: 8885591]

Ferris, C.; Grisso, T. Annals of the New York Academy of Sciences. Vol. 794. New York: Annals of the New York Academy of Sciences; 1996. Understanding aggressive behavior in children; p. 426-794.

Fields S, McNamara J. The prevention of child and adolescent violence: A review. Aggression and Violent Behavior. 2003; 8(1):61–91.

Gaines T, Barry LM. The effect of a self-monitored relaxation breathing exercise on male adolescent aggressive behavior. Adolescence. 2008; 43(170):291–302. [PubMed: 18689102]

Garand L, Mitchell AM, Dietrick A, Hijjawi SP, Pan D. Suicide in older adults: nursing assessment of suicide risk. Issues Ment Health Nurs. 2006; 27(4):355–70. [PubMed: 16546935]

Garno J, Gunawardane N, Goldberg J. Predictors of trait aggression in bipolar disorder. Bipolar Disorders. 2008; 10(2):285–292. [PubMed: 18271908]

Gillespie GL, Gates DM, Miller M, Howard PK. Workplace violence in healthcare settings: risk factors and protective strategies. Rehabil Nurs. 2010; 35(5):177–84. [PubMed: 20836482]

Graham K, Wells S. Aggression among young adults in the social context of the bar. Addiction Research and Theory. 2001; 9:193–219.

Greenfeld L, Henneberg M. Victim and offender self-reports of alcohol involvement in crime. Alcohol Research and Health. 2001; 25:20–31. [PubMed: 11496963]

Greydanus D, Pratt H, Greydanus S, Hoffman A. Corporal punishment in schools: A position paper of the Society for Adolescent Medicine. Journal of Adolescent Health. 1992; 13:240–246. [PubMed: 1498122]

Hagerman, RJ. Neurodevelopmental Disorders: Diagnosis and Treatment (Developmental Perspectives in Psychiatry). 1. New York: Oxford University Press, USA; 1999. Fragile X Syndrome; p. 61-132.

Hartley S, Sikora D, McCoy R. Prevalence and risk factors of maladaptive behaviour in young children with Autistic Disorder. Journal of Intellectual Disability Research. 2008; 52(10):819–829. [PubMed: 18444989]

Hay D, Castle J, Davies L. Toddlers' use of force against familiar peers: a precursor of serious aggression? Child Dev. 2000; 71:457–467. [PubMed: 10834477]

Herrera V, McCloskey L. Sexual abuse, family violence, and female delinquency: Findings from a longitudinal study. Violence & Victims. 2003; 18:319–334. [PubMed: 12968661]

Hodgins S, Kratzer L, McNeil T. Obstetric complications, parenting, and risk of criminal behavior. Archives of General Psychiatry. 2001; 58:746–752. [PubMed: 11483140]

Huesmann L, Moise-Titus J, Podolski C, Eron L. Longitudinal relations between children's exposure to TV violence and their aggressive and violent behavior in young adulthood: 1977–1992. Developmental Psychology, Special Issue: Violent children. 2003; 39:201–221.

Irwin A. The nurse's role in the management of aggression. Journal of Psychiatric & Mental Health Nursing. 2006; 13(3):309–18. [PubMed: 16737498]

Izard C, King K, Trentacosta C, Morgan J, Laurenceau J, Krauthamer-Ewing E, et al. Accelerating the development of emotion competence in Head Start children: Effects on adaptive and maladaptive behavior. Development and Psychopathology. 2008; 20:369–397. [PubMed: 18211742]

Jahn DR, Cukrowicz KC, Linton K, Prabhu F. The mediating effect of perceived burdensomeness on the relation between depressive symptoms and suicide ideation in a community sample of older adults. Aging Ment Health. 2010; 12:1.

Johnston, LD.; O'Malley, PM.; Bachman, JG. Monitoring the Future Study for Goal 6 of the National Education Goals: A Special Report for the National Education Goals Panel. Ann Arbor: Univ. Mich. Inst. Soc. Res; 1993.

Keenan K, Wakschlag L. More than the terrible twos: the nature and severity of behavior problems in clinic-referred preschool children. J Abnorm Child Psychol. 2000; 28:33–46. [PubMed: 10772348]

Kempes M, Matthys W, de Vries H, van Engeland H. Reactive and proactive aggression in children A review of theory, findings and the relevance for child and adolescent psychiatry. European Child & Adolescent Psychiatry. 2005; 14:11–19. [PubMed: 15756511]

Kramer M, Fombonne E, Platt R, Igumnov S, Vanilovich I, Matush L, et al. Effects of Prolonged and Exclusive Breastfeeding on Child Behavior and Maternal Adjustment: Evidence From a Large, Randomized Trial. Pediatrics. 2008; 121(3):e435–e440. [PubMed: 18310164]

Kramer M. Long-Term Behavioral Consequences of Infant Feeding: The Limits of Observational Studies. The Journal of Pediatrics. 2010; 156(4):523–524. [PubMed: 20149388]

Krug, E.; Dahlberg, L.; Mercy, J.; Zwi, A.; Lozano, R. World Health Organization. World report on violence and health. Geneva: 2002.

Kumpfer K, Alvarado R. Family-Strengthening Approaches for the Prevention of Youth Problem Behaviors. American Psychologist. 2003; 58(6/7):457–465. [PubMed: 12971192]

Lewis DO. From abuse to violence: psycho-physiological consequences of maltreatment. J Am Acad Child Adolesc Psychiatry. 1992; 31:383–91. [PubMed: 1350582]

Kunik ME, Snow AL, Davila JA, Steele AB, Balasubramanyam V, Doody RS, Schulz PE, Kalavar JS, Morgan RO. Causes of aggressive behavior in patients with dementia. J Clin Psychiatry. 2010; 71(9):1145–52. [PubMed: 20361896]

Landreville P, Bedard A, Verreault R, Desrosiers J, Champoux N, Monette J, et al. Non-pharmacological interventions for aggressive behavior in older adults living in long-term care facilities. International Psychogeriatrics. 2006; 18(1):47–73. [PubMed: 16487450]

Latalova K. Bipolar disorder and aggression. International Journal of Clinical Practice. 2009; 63(6): 889–899. [PubMed: 19490199]

Lipsky S, Caetano R, Field C, Larkin G. Is There a Relationship between Victim and Partner Alcohol Use during an Intimate Partner Violence Event? Findings from an Urban Emergency Department Study of Abused Women. Journal of Studies on Alcohol. 2005; 66(3):407–412. [PubMed: 16047531]

Litrownik A, Newton R, Hunter W, English D, Everson M. Exposure to Family Violence in Young At-Risk Children: A Longitudinal Look at the Effects of Victimization and Witnessed Physical and Psychological Aggression. Journal of Family Violence. 2003; 18(1):59–73.

Liu J. Early health risk factors for violence: Conceptualization, review of the evidence, and implications. Aggression and Violent Behavior. (in press).

Liu J. Concept Analysis: Aggression. Issues in Mental Health Nursing. 2004a; 25(7):693–714. [PubMed: 15371137]

Liu J. Childhood externalizing behavior-theory and implication. Journal of Child and Adolescent Psychiatric Nursing. 2004b; 17(3):93–103. [PubMed: 15535385]

Liu J, Raine A, Venables P, Dalais C, Mednick S. Malnutrition at age 3 years predisposes to externalizing behavior problems at ages 8, 11, and 17 years. American Journal of Psychiatry. 2004; 161(11):2005–2013. [PubMed: 15514400]

Liu J, Wuerker A. Biosocial bases of violence: Implications for nursing research. International Journal of Nursing Studies. 2005; 42:229–241. [PubMed: 15680620]

Liu J, Raine A, Wuerker A, Venables P, Mednick SA. The association of birth complications and externalizing behavior in early adolescents. Journal of Research on Adolescence. 2009; 19(1):93–111. [PubMed: 22485069]

Liu J, Cheng H, Leung PW. The application of the preschool child behavior checklist and the caregiver-teacher report form to mainland chinese children: Syndrome structure, gender differences, country effects, and inter-informant agreement. Journal of Abnormal Child Psychology. 2010 [Epub ahead of print].

Liu J, Li L, Fang F. Psychometric properties of the Chinese version of the Parental Bonding Instrument. International Journal of Nursing Studies. 2010 [Epub ahead of Print].

Loeber R, Hay D. Key issues in the development of aggression and violence from childhood to early adulthood. Annu Rev Psychol. 1997; 48:371–410. [PubMed: 9046564]

Lopez V, Emmer E. Influences of beliefs and values on male adolescents' decision to commit violent offenses. Psychology of Men & Masculinity. 2002; 3(1):28–40.

Lowry R, Powell KE, Kann L, Collins JL, Kolbe LJ. Weapon-carrying, physical fighting, and fight-related injury among U.S. adolescents. Am J Prev Med. 1998; 14:122–129. [PubMed: 9631164]

Magee SK, Ellis J. The detrimental effects of physical restraint as a consequence for inappropriate classroom behavior. Journal of Applied Behavior Analysis. 2001; 34(4):501–4. [PubMed: 11800190]

Malphurs J, Cohen D. A Statewide Case–Control Study of Spousal Homicide–Suicide in Older Persons. American Journal of Geriatric Psychiatry. 2005; 13(3):211–217. [PubMed: 15728752]

Malphurs JE, Eisdorfer C, Cohen D. A comparison of antecedents of homicide–suicide and suicide in older married men. Am J Geriatr Psychiatry. 2001; 9:49–57. [PubMed: 11156752]

McGirr A, Turecki G. The relationship of impulsive aggressiveness to suicidality and other depression-linked behaviors. Current psychiatry reports. 2007; 9:460–466. [PubMed: 18221625]

Miles DR, Carey G. Genetic and environmental architecture of human aggression. Journal of Personality and Social Psychology. 1997; 72:207–217. [PubMed: 9008382]

Mitty E, Flores S. Suicide in late life. Geriatr Nurs. 2008; 29(3):160–5. [PubMed: 18555157]

Moffitt T, Caspi A. Development and Psychopathology. Childhood predictors differentiate life-course persistent and adolescence-limited antisocial pathways among males and females. 2001; 13:355–375.

Mytton J, DiGuiseppi C, Gough D, Taylor R, Logan S. School-based secondary prevention programs for preventing violence. Cochrane Database of Systematic Reviews. 2006:3.

Nagin DS, Tremblay R. Trajectories of boys' physical aggression, opposition, and hyperactivity on the path to physically violent and non-violent juvenile delinquency. Child Development. 1999; 70:1181–1196. [PubMed: 10546339]

Oddy W, Kendall G, Li J, Jacoby P, Robinson M, Klerk Nd, et al. The Long-Term Effects of Breastfeeding on Child and Adolescent Mental Health: A Pregnancy Cohort Study Followed for 14 Years. The Journal of Pediatrics. 2010; 156(4):568–574. [PubMed: 20004910]

Olds D, Henderson C, Cole R, Eckenrode J, Kitzman H, Luckey D, Pettitt L, et al. Long-term Effects of Nurse Home Visitation on Children's Criminal and Antisocial Behavior. JAMA. 1998; 280(14): 1238–1244. [PubMed: 9786373]

O'Leary-Kelly AM, Griffin RW, Glew DJ. Organization-motivated aggression: A research framework. Academy of Management Review. 1996; 21:225–253.

Osofsky, L.; Scheeringa, M. Understanding and Preventing Violence. Washington, D.C: National Academic Press; 1997. Community and domestic violence exposure: effects of development and psychopathology; p. 155-180.

Patel V, Hope T. Aggressive behaviour in elderly people with dementia: A review. International Journal of Geriatric Psychiatry. 2004; 8(6):457–472.

Pickett W, Craig W, Harel Y, Cunningham J, Simpson K, Molcho M, et al. Cross-national Study of Fighting and Weapon Carrying as Determinants of Adolescent Injury. Pediatrics. 2005; 116(6):e855–e863. [PubMed: 16322143]

Pope H, Kouri E, Hudson J. Effects of Supraphysiologic Doses of Testosterone on Mood and Aggression in Normal Men. Archives of General Psychiatry. 2000; 57:133–140. [PubMed: 10665615]

Pulsford D, Duxbury J. Aggressive behaviour by people with dementia in residential care settings: a review. J Psychiatr Ment Health Nurs. 2006; 13(5):611–8. [PubMed: 16965482]

Raine A, Dodge K, Loeber R, Gatzke-Kopp L, Lynam D, Reynolds C, Stouthamer-Loeber M, Liu J. The Reactive-Proactive Aggression Questionnaire: Differential Correlates of Reactive and Proactive Aggression in Adolescent Boys. Aggressive Behavior. 2006; 32:159–171. [PubMed: 20798781]

Raine A, Reynolds C, Venables P, Mednick S, Farrington D. Fearlessness, stimulation-seeking, and large body size at age 3 years as early predispositions to childhood aggression at age 11 years. Archives of General Psychiatry. 1998; 55:745–751. [PubMed: 9707386]

Raine A, Lencz T, Nihrle S, LaCasse L, Colletti P. Reduced prefrontal gray matter volume and reduced autonomic activity in antisocial personality disorder. Archives of General Psychiatry. 2000; 57:119–127. [PubMed: 10665614]

Raine A. Annotation: The role of prefrontal deficits, low autonomic arousal and early health factors in the development of antisocial and aggressive behavior in children. Journal of Child Psychology & Psychiatry & Allied Disciplines. 2002; 43:417–434.

Rayner AV, O'Brien JG, Schoenbachler B. Behavior disorders of dementia: recognition and treatment. Am Fam Physician. 2006; 73(4):647–52. [PubMed: 16506707]

Reiss, A.; Roth, J. Understanding and preventing violence. Vol. 1. Washington, DC, US: National Academy Press; 1993. p. 464

Richmond TS, Schwab CW, Branas CC. Firearm availability and childhood death.[Editorial Commentary]. Journal of Trauma: Injury, Infection, and Critical Care. 2002; 52:274–275.

Rickson DJ, Watkins WG. Music therapy to promote prosocial behaviors in aggressive adolescent boys--a pilot study. Journal of Music Therapy. 2003; 40(4):283–301. [PubMed: 15015908]

Rosen T, Lachs M, Bharucha A, Stevens S, Teresi J, Nebres F, et al. Resident-to-resident aggression in long-term care facilities: insights from focus groups of nursing home residents and staff. J Am Geriatr Soc. 2008; 56(8):1398–1408. [PubMed: 18637979]

Rosenbaum M. The role of depression in couples involved in murder–suicide. Am J Psychiatry. 1990; 147:1036–1039. [PubMed: 2375438]

Rosenberg, MS.; Rossman, BB. Multiple Victimization of Children: Conceptual, Development, Research, and Treatment Issues. 1. New York: Routledge; 1998. Maltreated adolescents: victims caught between childhood and adulthood; p. 107-129.

Rowand R, Smith S, Miller D, Brownell M. Cognitive behavior modification of hyperactivity–impulsivity and aggression: A meta-analysis of school-based studies. Journal of Educational Psychology. 1999; 91(2):195–203.

Schat AC, Kelloway EK. The effects of perceived control on the outcomes of workplace aggression and violence. Journal of Occupational Health Psychology. 2000; 4:386–402. [PubMed: 10912501]

Schulz R, Beach SR. Caregiving as a risk factor for mortality: the caregiver health effects study. JAMA. 1999; 282:2215–2219. [PubMed: 10605972]

Sharkin B. Road Rage: Risk Factors, Assessment, and Intervention Strategies. Journal of Counseling & Development. 2004; 82(2):191–198.

Shub D, Ball V, Abbas AA, Gottumukkala A, Kunik ME. The link between psychosis and aggression in persons with dementia: a systematic review. Psychiatr Q. 2010; 81(2):97–110. [PubMed: 20058077]

Stoff, D.; Cairns, R. Aggression and violence: Genetic neurobiological, and biosocial perspectives. Mahwah, NJ: Lawrence Erlbaum; 1996.

Sukhodolsky D, Kassinove H, Gorman B. Cognitive-behavioral therapy for anger in children and adolescents: a meta-analysis. Aggression and Violent Behavior. 2004; 9(3):247–269.

Taft C, Vogt D, Marshall A, Panuzio J, Niles B. Aggression among combat veterans: Relationships with combat exposure and symptoms of posttraumatic stress disorder, dysphoria, and anxiety. Journal of Traumatic Stress. 2007; 20(2):135–145. [PubMed: 17427912]

Talerico K, Evans L. Making Sense of Aggressive/Protective Behaviors in Persons with Dementia. Alzheimer's Care Quarterly. 2000; 1(4):77–88.

Talerico KA, Evans LK, Strumpf NE. Mental health correlates of aggression in nursing home residents with dementia. Gerontologist. 2002; 42(2):169–77. [PubMed: 11914460]

Taten A, Schumacher J, Taft C, Stanley M, Kent T, Bailey S, et al. Intimate Partner Aggression Perpetrated and Sustained by Male Afghanistan, Iraq, and Vietnam Veterans With and Without Posttraumatic Stress Disorder. J Interpers Violence. 2010; 25(9):1612–1630. [PubMed: 20023200]

Tateno A, Jorge R, Robinson R. Clinical correlates of aggressive behavior after traumatic brain injury. J Neuropsychiatry Clin Neurosci. 2003; 15(2):155–160. [PubMed: 12724455]

Tremblay, RE.; Boulerice, B.; Harden, PW.; McDuff, P.; Perusse, D.; Pihl, RO.; Zoccolillo, M. Human Resources Development Canada & Statistics Canada. Growing up in Canada: National longitudinal survey of children and youth. Ottawa: Statistics Canada; 1996. Do children in Canada become more aggressive as they approach adolescence?; p. 127-137.

Tremblay R. Developmental origins of disruptive behaviour problems: the 'original sin' hypothesis, epigenetics and their consequences for prevention. Journal of Child Psychology and Psychiatry. 2010; 51(4):341–367. [PubMed: 20146751]

Treuting J, Hinshaw S. Depression and Self-Esteem in Boys with Attention-Deficit/Hyperactivity Disorder: Associations with Comorbid Aggression and Explanatory Attributional Mechanisms. Journal of Abnormal Child Psychology. 2001; 29(1):23–39. [PubMed: 11316333]

U.S. Department of Health & Human Services, Administration for Children and Families. Child maltreatment. 2008.

U.S. Department of Justice, Bureau of Justice Statistics. Violent crime rates. 2008.

U.S. Department of Justice, Federal Bureau of Investigation. The Uniform crime reports. 2007.

U.S. Department of Justice, Federal Bureau of Investigation. Crime in the United States. 2009.

Vitale S, de Mheen Dv. llicit drug use and injuries: A review of emergency room studies. Drug and Alcohol Dependence. 2006; 82(1):1–9. [PubMed: 16183213]

Vitaro F, Gendrau P, Tremblay R, Oligny P. Reactive and proactive aggression differentially predict later conduct problems. Journal of Child Psychology and Psychiatry. 1998; 39:377–385. [PubMed: 9670093]

von Knorring AL, Soderberg A, Austin L, Uvnas-Moberg K. Massage decreases aggression in preschool children: a long-term study. Acta Paediatrica. 2008; 97(9):1265–9. [PubMed: 18782279]

Werbach M. Nutritional Influences on Aggressive Behavior. Journal of Orthomolecular Medicine. 1992; 7(1):45–51.

Williams J, Ross L. Consequences of prenatal toxin exposure for mental health in children and adolescents: A systematic review. European Child & Adolescent Psychiatry. 2007; 16(4):243–253. [PubMed: 17200791]

Young SN. How to increase serotonin in the human brain without drugs. Journal of Psychiatry & Neuroscience. 2007; 32(6):394–9. [PubMed: 18043762]

Zeanah, C.; Scheeringa, M. Children in a Violent Society. New York: Guilford; 1997. The experience and effects of violence in infancy; p. 97-123.

Zeller A, Hahn S, Needham I, Kok G, Dassen T, Halfens R. Aggressive behavior of nursing home residents toward caregivers: a systematic literature review. Geriatr Nurs. 2009; 30(3):174–187. [PubMed: 19520228]

Zirpoli, TJ. Behavior management: Applications for teachers. 5. Upper Saddle River, N.J: Pearson/ Merrill Prentice Hall; 2008.

Table 1

Characteristics of and Risk Factors for Aggressive Behavior Across Different Age Groups

Age Group	Characteristics	Underlying & Contextual Risk Factors	Preventive Strategies
Toddlers	Crying, screaming, biting, kicking, throwing, and breaking objects. Aggressive behavior peaks before age 2.	Genetic factors and Biological factors (e.g. birth complications, nutritional deficit, etc.). Imitation of others aggression (Social Learning Theory). After repeated exposure to specific social stimuli. (Social Information Processing Theory). Psychosocial and environmental factors (such as poor parenting)	• Parents should present child with age/ developmentally appropriate tasks and expectations. • Parents must set limits on hurtful aggressive behavior. • If there is a “trigger” to the aggressive behavior, the child can be removed from stimulus situation.
School-Age Children	Teasing, irritability, bullying, fighting, cruelty to animals, and fire-setting. Non-physical aggressive behavior (e.g., verbal, psychological) increases. Symptoms of sexual or physical abuse to the child. It is important to assess for potential abuse in these patients.		• Classroom-based programs that emphasize skill-building, such as self-monitoring and self-regulating emotions and behaviors; increasing relationships among peers; and using communication skills to express anger, frustration, etc. • Teacher-led classroom discussions about aggressive behavior to facilitate open communication about aggression as a problem and make students more aware of its existence, possible triggers, and consequences. • Institute programs (e.g. massage therapy, relaxation breathing, music therapy) to reduce aggressive behavior • Avoid use of physical restraints • Inclusion of parents and family to reinforce learned skills in the home.
Adolescents	More serious aggressive behavior and even violence appear. Gang activities including stealing, truancy, etc. Cross-gendered aggressive behaviors, including dating violence, date rape, and sexual assault. Suicide is the 3rd leading cause of death for this group.	Aggressive behavior that appears in only adolescence and disappears in later life (Adolescence-limited antisocial behavior). Learned aggressive behavior in childhood that carried over into adolescence. Depression, family and other relationship difficulties, and a family history of suicide (or personal history of suicide attempts) may place an adolescent at greater risk for suicidal behavior. Substance abuse	• Teaching conflict resolution and social competency in the classroom setting. • Target specific risk factors associated with adolescent aggressive behavior, such as underage alcohol use. • Classroom discussions, including role playing and skill rehearsal, to help adolescents learn coping strategies and problem solving. • Creating a positive academic environment, including extracurricular activities, sports, and arts programs. Additionally, a positive school environment should include the presence of teachers and other professionals who convey a caring and supportive attitude toward students. • Institute programs (e.g. massage therapy, relaxation breathing, music therapy) to reduce aggressive behavior
Adults	Domestic violence, sexual abuse, child abuse, and homicide. Highest homicide rate among age groups.	Drug use Traumatic brain injury to areas responsible for managing aggression and impulse control	• Use of the prevention strategies for children and adolescents mentioned above, particularly school programs, (where children and teens spend much of their time), may prevent aggressive behavior later in adulthood. • Occupational programs that focus on awareness of workplace violence, bullying, and anger management.

Age Group	Characteristics	Underlying & Contextual Risk Factors	Preventive Strategies
			• Target specific risk factors associated with adult aggressive behavior, such as substance abuse • If necessary, prevent harm to vulnerable parties (e.g. children)
Elderly	Older adults in nursing homes due to daily interactions with staff and other residents. Aggressive behaviors aimed at caregivers center on intimate care practices or those that cause pain. Aggressive behavior aimed at fellow residents in the context of excessive vocalization, territoriality, arguments with roommates, and general loneliness or frustration.	The emergence of dementias such as Alzheimer's disease may result in misunderstanding of motives. Aggression may result from this confusion. The annual incidence of homicide-suicide is higher in adults 55 years and older and typically occurs more among couples. Multifactorial etiology	• Many preventive interventions have been proposed and tested to reduce aggressive behavior among persons with dementia. These include managing pain, including administering analgesics prior to personal care; knowing and honoring the resident as a person; communicating clearly, calmly and in a warm manner; explaining actions before performing them to reduce surprise or startle; involving the resident in performing self-care; staff consistency in assignments; avoiding use of restraints; and environmental stimulus control (e.g., providing lighting, reducing noise and confusion). • Implement special care units for aggressive patients • Special training for the staff on how to deal with aggressive behavior in older adults