CHAPTER 10

# Children and Digital Media

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## OVERVIEW

Twenty-first-century environments are digital. Media become integrated into U.S. children's lives soon after birth, and media provide an ongoing backdrop for everyday living throughout development (Calvert & Valkenburg, 2013). Children use media in their homes, as they walk down the street, in restaurants, in planes, trains, and automobiles, in gyms, and even in schools except when the use of media is explicitly banned.

Media are integrated into children's everyday environments for two main reasons: because children choose to use them, known as *foreground* or *active exposure*, and because others are using media and children are inadvertently exposed, known as *background* or *passive exposure* (Huston, Wright, Rice, Kerkman, & St. Peters, 1990). Media experiences are beloved by many children, with entertainment and friends at their fingertips, making media a preferred foreground experience chosen by virtually all of them. They use media for many purposes, including observational learning of how to interact with others, social interactions with others through interfaces such as mobile phones, the Internet, and electronic gaming, or just to sit back and relax as they become immersed in the stories of others through televised programs, DVDs, and films. Media are informal teachers, providing a platform for children to explore and learn about a wide range of content, including educational lessons, violent behavior, and how to be a sexual person.

Media are also distractors, interrupting daily activities, disrupting concentration, and providing a constant stream of stimulation that is at times voluntarily chosen, and at times not. When involuntary exposure occurs, background media can be harmful to developmental outcomes (American Academy of Pediatrics, 2011). Foreground media exposure can also be harmful, such as children selecting violent television programs for viewing (Wilson, 2008).

This chapter explores media in its many forms, how it has evolved and is evolving, how media influence children's development, and how children influence media in its newer forms. The chapter begins with a discussion of the key theoretical perspectives from the disciplines of psychology and communications that have been brought to bear on media effects. Social cognitive theory and parasocial relationships frame the social relationships that influence children's behavior and learning through role models as well as through friendships that children develop with media characters (Bandura, 1986, 1997; Hoffner, 2008). Cognitive models that use scripts, schemas,

and stages are used to explain age-related differences in story comprehension as well as how the same cohort takes away entirely different media messages because of schematic processing (Calvert & Huston, 1987). The cultivation hypothesis examines how the kind of content available to children influences their beliefs about the world in which they live (Gerbner, 1972). Uses and gratification theory addresses why children view and use media: In the United States, it is mainly to fulfill their need for entertainment (Rubin, 2002). Arousal theory is considered in relation to aggressive and sexual content, in which desensitization dulls responses to real-life experiences (Zillmann, 1991). Psychoanalytic theory is used to discuss aggression, sexuality, and the development of identity (Erikson, 1963; Hall, 1999). Learning models emphasize reinforcement contingencies and classical conditioning principles (Miller, 2009).

The history of media is then considered. Although newer interactive media are rapidly entering children's lives, the colonization of children's leisure time through television viewing continues to play the dominant role in their daily experiences (Wartella & Robb, 2008). The vast penetration of electronic media into children's homes is the next topic, focusing on access to technology as well as use and exposure patterns, with the latter taking into account multitasking and the use of mobile technologies (Rideout, Foehr, & Roberts, 2010). Media diets and foreground and background exposure are considered.

The media environments of children are then discussed, initially focusing on content when available, then turning to evidence of effects on children and youth. The first focus is on the disappearance of quiet environments, as media have become an ever-present aspect of children's lives. The effects of noisy environments are considered in terms of declines in imaginative activities and creativity, disrupted sleeping patterns, and distractions that occur when multitasking. However, there are important exceptions to these negative influences. A media diet of prosocial television programming, for instance, can lead to enhanced imaginative play for young children, as well as higher levels of creativity when children become adolescents (D. R. Anderson, Huston, Schmitt, Linebarger, & Wright, 2001). Then the social nature of media environments is examined, including prosocial media and role models, parasocial relationships that children develop with media characters, and online social relationships that children engage in through social networks.

The mean and scary world follows, with descriptions of how media violence has aroused, desensitized, and

influenced the cognitive scripts and behaviors of children and adolescents in observational as well as interactive media. This scary media world is not just about violent content, but where children experience the supernatural, either by choice or by accident. The gendered world of media is discussed, which is a world that is still dominated by heterosexual European American men who are strong and powerful, supported by emotional women who define themselves by their physical appearance and are less often visible onscreen (Hust & Brown, 2008). Online experiences also provide opportunities for youth to express who they are, and they do so, often in sexual ways during the adolescent years when sexuality is becoming a key aspect of how youth define themselves (Subrahmanyam, Smahel, & Greenfield, 2006). Efforts to reduce youth exposure to sexually explicit online content are considered (Thornburgh & Lin, 2002), which have been complicated by peer-to-peer file sharing such as sexting, in which youth send nude or semi-nude pictures to one another (Lenhart, 2009).

The marketing of energy-dense, high-caloric foods to children is addressed in relation to the surge in the pediatric obesity rate (Institute of Medicine [IOM], 2006). The social marketing of healthier products to children, in part through popular media characters, is considered as one option to reduce the obesity crisis, as are interactive media, such as sensors that track energy expenditure and exergames that require gross motor movement for play (Calvert, Bond, & Staiano, 2014). Exposure to media portrayals of alcohol, tobacco, and drug influences on children's behavior is considered, particularly when attractive role models engage in these behaviors (Roberts & Christenson, 2000). Social policies are then addressed.

Conclusions are drawn about children's lives in the 21st century, where they are digital natives (Prensky, 2001), but soon will be displaced by the next generation of children whose lives will be embedded in the next generation of media. In the media area more so than any other, the only constant is rapid change.

## THEORETICAL PERSPECTIVES ON MEDIA USE AND EFFECTS

The study of children's media is multidisciplinary and interdisciplinary, spanning diverse fields including child psychology, child development, communications, health, medicine, and public policy. This diversity occurs, in part, because of the pervasive influence of media content and media experiences on a broad range of topics and developmental outcomes. For this reason, the theories brought to bear on understanding the impact of media on children's development employ a range of different approaches. Theories of development that are grounded in psychology and theories of communication are the key approaches that have been used to describe and examine the influences of media on children and adolescents. Some of these theories, such as communication theories, psychoanalytic theory, and behaviorism, are less often used in contemporary developmental science, but they are useful for addressing core issues that are germane to the media area.

### Social Cognitive Theory

Social cognitive theory has played a central role in explicating the role of media on children's behavior (Bandura, 1986, 1997). Children learn behaviors through processes of observational learning, and later translate some of those actions into their own behavioral repertoire if there are sufficient motivational incentives to do so. The subprocesses of social cognitive theory involve attention to information, retention of that information through encoding and representational processes, production of that behavior, and motivation to do so which involves perceptions of rewards or punishments for acting on what one has observed. Self-efficacy, the perception that one can control the events around one, influences whether or not observers will act on an event that they have seen (Bandura, 1997).

Role models are central to Bandura's theoretical approach, with children who identify with certain media characters becoming more likely to imitate their actions. When undesirable behaviors are not punished or are even rewarded, disinhibition can occur, making it more likely that children will imitate antisocial behaviors (Bandura, 1986). Response facilitation occurs when children observe and then imitate models perform socially constructive, prosocial behaviors, some of which have previously been low in frequency (Bandura, 1986). Social cognitive theory is content neutral in predictions, and has been used to explain why and how children imitate a range of behaviors, including aggressive behavior, prosocial actions, gender-stereotypical or gender-counterstereotypical behaviors, and health-related behaviors.

### Parasocial Relationships and Parasocial Interactions

In the field of communications, parasocial relationships and parasocial interactions describe the kinds of

social experiences that children perceive that they have with media characters. Parasocial interactions originally described adults' relationships with televised newscasters who looked directly into the camera lens and spoke to the audience as if they were having a conversation (Horton & Wohl, 1956). Through these experiences, viewers came to trust certain newscasters and acted like they had a personal relationship with them (Horton & Wohl, 1956). Parasocial interaction and parasocial relationship were once considered the same phenomenon. Parasocial relationships now describe ongoing personal bonds with favorite characters, but parasocial interactions can take place one time (Schramm & Hartmann, 2008).

With a few notable exceptions (see Hoffner, 1996, 2008), research has examined adults' parasocial interactions and relationships with media characters rather than children's parasocial relationships and interactions. However, parasocial interaction techniques are often used in children's media with characters who directly address the child audience through the camera lens, talk to the child and pause for a reply, and then act as if they heard what the child said (Lauricella, Gola, & Calvert, 2011). In essence, characters act as if they are in an interaction with children in the viewing audience, and children, in turn, often reply to the characters through their own actions and words (D. R. Anderson et al., 2000), with those who respond to characters demonstrating better plot comprehension (Calvert, Strong, Jacobs, & Conger, 2007). Children also have favorite characters (Hoffner, 1996), and these personal relationships with media characters may indicate a parasocial relationship, which also predicts their learning (Calvert & Richards, 2014).

## Cognitive Approaches

Children's programs are presented through story or magazine formats (J. C. Wright et al., 1984). Mature plot comprehension involves separating the central, plot-relevant from the incidental, irrelevant program content, ordering the central content into a story scheme, and drawing inferences about characters' motives and integrating the cause-event sequences that organize the story (W. A. Collins, Wellman, Keniston, & Westby, 1978). Prior to Ages 9 and 10, children have difficulty in understanding implicit program information, such as character motives and feelings (W. A. Collins et al., 1978).

Because children must understand motives and intent to comprehend television stories (W. A. Collins et al.,

1978) and advertisements (Calvert, 2008a), cognitive theories are often used to examine the impact of media on children's learning and social behavior. The theories of Piaget (1954), Vygotsky (1962, 1978), and various information-processing approaches have been used to examine children's comprehension of televised narratives, their social behavior, and their comprehension of commercial intent (i.e., that advertisements are designed to persuade consumers to buy products), which is often blurred by marketing practices (Calvert, 2008a; Kunkel & Castonguay, 2012).

The visual and verbal ways that content is presented can be linked to developmental differences in how children think in iconic or symbolic modes (Calvert, 2005). Modes of thought have been used to understand plot comprehension, as are scaffolds provided by parents or other adults, such as teachers, to help children reach just beyond their current level of comprehension to advance their understanding of program-related content (Vygotsky, 1962, 1978). Cognitive developmental approaches have also been used to understand gender constancy in relation to children's selective attention and memory of program-related material (e.g., Luecke-Aleksa, Anderson, Collins, & Schmitt, 1995). In information-processing theory, viewers' schemas guide children's selective attention and understanding of content.

## The Cultivation Hypothesis

Because content influences the impact that media has on children and adolescents, content analyses, in which the kind of onscreen information is analyzed, have been conducted in numerous areas, including media aggression, prosocial behavior, gender-stereotyped behaviors, health-related behaviors, and sexuality (Calvert & Wilson, 2008). Gerbner (1972) argued that media content depicts the power structure and symbolic relationships among people in a social system, as reflected in his Violence Index that tracked the amount of violent content in television programs. For instance, female characters, particularly women of color, are often symbolically annihilated on television, appearing much less frequently than male characters do, which reflects their trivialization and lack of power in U.S. culture (Tuchman, 1979).

In Gerbner's cultivation hypothesis, media exposure can promote certain beliefs and expectations. For instance, repeated exposure to violent content can lead to *mainstreaming*, which leads to the construction of a shared

vision of reality as a violent place because so much of the content is violent (Gerbner, Gross, Morgan, & Signorielli, 1994). Exposure to content can also *resonate* with viewers' own experiences if what they view is consistent with something that has happened to them (e.g., being mugged in real life could resonate with seeing depictions of muggings onscreen; Gerbner et al., 1994). The Internet allows underrepresented youth to create their own shared realities, as when sexual minorities present themselves and find support from others through blogs in the form of online personal diaries (Huffaker & Calvert, 2005).

### Uses and Gratification Theory

Uses and gratification theory explains why we use media. In this approach, children select certain media content and experiences (the uses) to fulfill certain emotional and social needs (the gratifications; Rubin, 1994). Three main motivations to use media have emerged: for diversion and escape, for personal identity construction or social utility (such as strengthening contact with others), and to gain information, such as social information about others (Rubin, 2002). Selective exposure to media, then, depends on the needs of the users.

### Arousal Theory

Arousal theory involves physiological responses in relation to real or imagined events (Calvert, 1999). Autonomic arousal, the typical focus in media studies of emotion, has been measured physiologically with heart rate and skin conductance (Zillmann, 1982) as well as by facial expressions (Cantor & Hoffner, 1990). With increased exposure, habituation occurs and desensitization takes place. As a consequence, the content must become more extreme to create the original arousal level, although arousal can return to its former level after sufficient time passes and disinhabituation occurs (Zillmann, 1982). Arousal has no predetermined direction for outlets, instead being triggered by immediate environmental influences (Zillmann, 1982).

Arousal theory can also be linked to uses and gratification theory and to children's selective exposure decisions. That is, media can be used to regulate arousal levels. Those who are bored may search for content that stimulates them, whereas those who are anxious may search for content that relaxes them. For instance, children can regulate their own arousal levels by choosing whether or not to view scary and aggressive content.

### Psychoanalytic Theory

Freud proposed that humans are by nature aggressive and sexual, which represents the destructive and libido instincts, respectively (Hall, 1999). To release pent up drives, energy is released through various mechanisms, such as catharsis, in which a fantasy experience can substitute for a real experience (Hall, 1999). Theoretically, viewing or playing with aggressive content can drain off aggressive impulses in a way that is not harmful to others. When studying media, most social scientists have used Freud's approach to psychoanalytic theory.

Within psychoanalytic theory, an overlooked variation of Freud's ideas is Jung's articulation of archetypes as an explanation for interest in media portrayals, such as violence. Archetypes are prototypical experiences of humans represented in media by symbols such as the hero, the villain, the wise old man, the mother, the father, the child, the shadow (generally representing the dark side of human nature), the sun, and a wolf howling at the moon (Hall & Nordby, 1999). When applied to media, the archetype of the hero represents the fight for good over evil against the villain, including the hero's struggle to stay just when engaging in behaviors that can take a person to the dark side of the emotions, such as feelings of anger and revenge (Calvert, Kondla, Ertel, & Meisel, 2001).

Another variation of psychoanalytic theory developed by Erikson (1963) adds psychosocial to psychosexual stages. Identity formation is central to this paradigm, as are other developmental tasks experienced by children at different points in their development (Erikson, 1963). Online experiences can be a resource for youth to construct their identities (Calvert, 2002; Subrahmanyam et al., 2006).

### Behaviorism and Classical Conditioning

Although not used as much in contemporary developmental research, media influences continue to examine rewards and punishments. That which is reinforced tends to recur, and behaviors that are punished tend to decrease. The mere exposure effect, based on classical conditioning principles, is an example of how repeatedly exposing viewers to content can lead to positive feelings about it (Auty & Lewis, 2004). Marketing often uses behavioral conditioning principles by, for example, pairing branded media characters with foods or by placing products (i.e., product placement) in films or electronic games that they want children to purchase and consume (Auty & Lewis, 2004; Calvert, 2008a). The consumer, in this instance,

is being exposed to a subliminal message, and hence, may select that food because of associations with positive experiences, such as playing a game (Calvert, 2008a).

## Summary

Theories based in psychology and in communications have been used to explain why children use media, how they learn from media, and how they feel and act after media exposure. In cognitive theories, such as those put forth in schema theories and cognitive developmental theories, cognition organizes experience and behaviors (Huston, 1983). By contrast, in theories that come from a learning tradition, such as behaviorism and social cognitive theory, behavior occurs mainly due to reinforcement contingencies in the environment (Huston, 1983). Bandura (1986, 1997) did include cognitive mechanisms in his approach, including attention, retention, and self efficacy, but developmental changes in thought, such as those advanced by Piaget (1954), are absent from his approach. Parasocial relationships and parasocial interactions expand Bandura's ideas to social relationships with media characters as perceived friends, not just as role models (Calvert & Richards, 2014).

## THE HISTORY AND EVOLUTION OF MEDIA PLATFORMS

From birth onward, children's lives are embedded in a complex web of media that pervade their daily existence (Common Sense Media, 2011, 2013; Rideout et al., 2010). According to Wartella and Robb (2008), extensive electronic media experience marked a major change in the lives of children over the past century. In 1934, adolescents spent an average of *10 hours each week* with media. They now spend *more than 10 hours each day* with media when multitasking is included (Rideout et al., 2010; Wartella & Robb, 2008).

Face-to-face interactions in indoor and outdoor settings were normative at the beginning of the 20th century, with book reading as the main medium available for children to use. The electronic media of films and radio became popular in theaters and homes by the 1930s with radio becoming an option in cars. No environmental media influence, however, has been or has remained as powerful as television, which colonized children's leisure time as it entered children's homes during the 1950s (Wartella & Robb, 2008).

Television has been conceptualized as the electronic hearth of the home (Tichi, 1991), with parents and their children originally viewing together in their family or living rooms because they only had one television set. After World War II, recreational media moved from the public space of theaters to television sets inside the home, with penetration rates reaching 66% of U.S. homes between 1948 and 1955, and almost 90% by 1960 (Spigel, 1992). The popularity of viewing television programs has not diminished, even as newer interactive media appeared (Rideout et al., 2010), but children now view television programs online as well as on traditional television screens (Rideout et al., 2010).

Electronic video games became popular in the 1970s with personal computers becoming a common feature in homes during the 1980s. Children initially played video games on consoles and personal computers that were rather large, with later devices becoming smaller with options such as Gameboys. As the Internet moved into homes in the 1980s and 1990s, online experiences became an increasingly common activity for youth (Pempek, Yermolayeva, & Calvert, 2009). As the 20th century moved to a close, changes in Internet speed and emerging interfaces such as social networks led to a shift from online interactions with strangers to interactions with friends, particularly for adolescents who as a group tend to be early adopters of newer technologies (Pempek et al., 2009). Gaming became an online experience that continued to include strangers who were linked across the world in competitive experiences, such as massive multiplayer online role playing games (Tarpley, 2012). Sensor-based systems that originally involved hand-held devices, such as the controllers held to play games (Staiano & Calvert, 2011a), can track a person's movement and embed them onscreen as avatars that represent the player without any external device. These trends reflect an electronic hearth that is no longer a one-way experience that can now situate children within onscreen experiences.

The penetration of mobile technologies, such as musical devices, electronic tablets, and mobile phones, allows youth to be connected to media and to move seamlessly across them 24/7. Mobile technologies are a gateway to a vast array of information. With the computer as the hub of the wheel, the media environments of children are now integrated, providing multiple functions to youth as they use their mobile phones to listen to music, text or call one another, watch an online television program or film, or play an online game or mobile app.

Underlying this playful online experience is a business that is directed at profit making, which places children in a highly sophisticated commercial culture throughout their lives (Montgomery, 2012). Tracking software follows many of the keystrokes and activities of users, leading to a vast and detailed knowledge base for marketers to influence consumer attitudes and behaviors, which raises serious privacy issues (Montgomery, 2012).

Although the technologies are changing quickly, the developmental needs of children, such as friendship creation, identity formation, and emotional regulation, have remained constant (Calvert & Wartella, 2014). Indeed, children use media as a space in which they acquire information that addresses developmental needs, such as their sexual identity (Subrahmanyam et al., 2006). Developmental and communication theories which could account for media effects emerged and advanced during the same time frame that media were evolving, lending themselves to ongoing inquiries about how media influences children.

## THE ECOLOGY OF THE DIGITAL WORLD

Children's worlds are increasingly electronic and digital where information is accessed, delivered, and distributed by screen media rather than by traditional hard or soft cover books. Presumably, the impact of media depends on media access and exposure. Access is relatively straightforward: A child or the family has the technology, and children can use it. But what exactly is media exposure? Definitional and measurement issues create challenges in answering the latter question.

### Media Access

Numerous surveys have taken place in the United States over the past two decades to measure media access. These include Kaiser Family Foundation surveys with nationally representative samples conducted on 8- to 18-year-olds, which were published in 1999, 2005, and 2010, as well as younger children who were 0 to 6, published in 2003 and 2006, and then followed up on by Common Sense Media in 2011 and 2013.

The 2013 survey of U.S. parents of 0- to 8-year-olds ($N = 1,463$) by Common Sense Media documented the extensive penetration of screen media in young children's homes. As seen in Table 10.1, 96% of these children's homes had a television set, 76% had a computer (69%

**TABLE 10.1    Media Present in 0- to 8-Year-Old U.S. Children's Homes**

| | Among all children 0 to 8, percentage with each item in the home |
|---|---|
| TV | 96% |
| Cable or satellite TV | 70% |
| DVD player | 78% |
| DVR | 28% |
| Computer | 76% |
| High-speed Internet | 69% |
| Video game console | 63% |
| Handheld video game player | 35% |
| Smartphone | 63% |
| Video iPod or similar device | 27% |
| Kindle, Nook, or similar e-reader | 21% |
| iPad or similar tablet device | 40% |

*Source:* Common Sense Media (2013), a nonpartisan nonprofit organization (www.commonsense.org).

of which had high-speed Internet access), and 63% had a video game player. Television sets often had cable or satellite access, a DVD player, or a digital video recorder. Thirty-six percent of these children had their own television set in their bedrooms, 22% had a DVD or VCR player, 9% had a video game player, and 3% had a computer. A major change in access to mobile devices occurred in children's homes between 2011 and 2013. Overall, young children's mobile media access doubled from 2011 to 2013, and mobile media use tripled for young children during that time frame. In 2013, smartphones were available in 63% of homes compared to 41% in 2011, e-readers (like the Kindle and Nook) were found in 21% of homes compared to just 9% in 2011, and tablets (such as iPads) were found in 40% of homes compared to just 8% in 2011. Seven percent of 0- to 8-year-olds had their own tablet in 2013. Consistent with these findings, Wartella, Rideout, Lauricella, and Connell (2013) found that mobile devices were becoming prevalent in a nationally representative sample of low-income families with children under the age of 8 during 2012; specifically, 55% of these families had smartphones, though only 18% had tablets.

For U.S. children who were ages 8 to 18, the penetration rates of media in children's homes, particularly interactive and mobile media, were much higher than those of younger children. In a survey of 8- to 18-year-old U.S. children ($N = 2,002$) conducted by Rideout et al. (2010), 99% of these children lived in homes with a television set (84% with cable or satellite options). The typical U.S. home for older children had 3.8 television sets, 2.8 DVD or VCR players, 1 digital video recording device, 2.3 video game

**Among all 8- to 18-year-olds, percentage who own each platform**
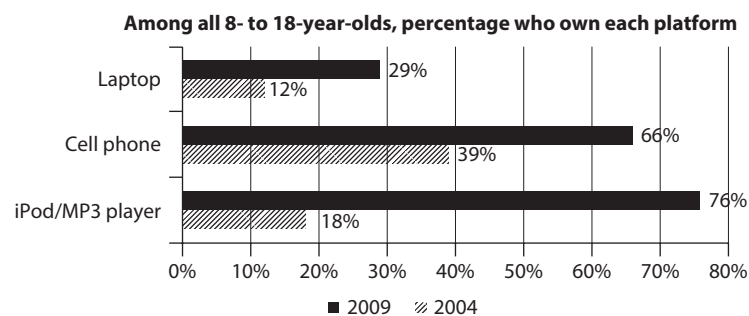


**Figure 10.1**    Increases in mobile media access over time.

*Source: The Media Family: Electronic Media in the Lives of Infants, Toddlers, Preschoolers and Their Parents*, by V. Rideout, U. Foehr, and D. Roberts, 2010, Menlo Park, CA: Kaiser Family Foundation. Reprinted with permission.

consoles, 2.5 radios, 2.2 CD players, and 2 computers. With few exceptions, more and more media entered 8- to 18-year-old U.S. children's bedrooms between 1999 and 2010, which enabled youth to exercise considerable control over their own media preferences and media exposure.

Mobile phones are mini computers, linking children to communication options as well as virtually any kind of information throughout the Internet, anytime and anywhere that the signal will travel uninterrupted. As seen in Figure 10.1, a major increase occurred from 2005 and 2010 in youth access to mobile media, including iPod/MP3 players, mobile phones, and laptops. Mobile phones became increasingly popular for all age groups, with older children owning these devices more than younger ones. Portable CD/tape players declined over time, perhaps because iPods and MP3 became music players, and music has again migrated, now to smartphones.

### Defining Media Exposure

Children's exposure to video content includes a mixture of foreground and background content. Just because a television set is "on" does not mean that children are paying attention to the content. In fact, very little relation was found in homes between children looking at a screen and being in the room with an operating television set, in part because exposure was occurring in the backdrop of family activities, such as playing or even sleeping (D. R. Anderson, Field, Collins, Lorch, & Nathan, 1985).

For foreground exposure, eyes on screen may be the most valid measure. Even so, one can be looking at a screen and not really paying attention (Calvert, 1999). Doing another activity during viewing may also indicate that television viewing is a foreground or a background activity, as children may still be responsive to the audio

track in both instances. That is, they may intentionally look back at the screen when they think that something interesting is about to happen, or they may automatically look back at the screen when a primitive attentional orienting response is elicited, such as a loud onscreen noise (Calvert, Huston, Watkins, & Wright, 1982). Foreground exposure is more likely to be age-appropriate than is background exposure, but background exposure also affects developmental outcomes (D. R. Anderson & Pempek, 2005). For instance, background media exposure disrupts children's play, a contributor to early cognitive development (Schmidt, Pempek, Kirkorian, Lund, & Anderson, 2008).

A *media diet*, consisting of the overall amount (quantity) and the kind of exposure (quality), is another consideration in defining media exposure (D. R. Anderson & Hansen, 2009). The quantity of media exposure can be correlated with certain developmental outcomes simply because that kind of content is more available. For instance, most television programs contain violent content (Wilson, 2008), and hence overall television exposure may be correlated with aggressive outcomes. The kind of media exposure, such as exposure to aggressive or prosocial material, is useful for assessing specific media effects (D. R. Anderson et al., 2001).

Exposure is somewhat easier to assess for interactive than for observational media because children are typically doing some kind of physical behavior, such as touching the screen or moving content around. However, trends for multitasking that emerged in the Kaiser Family Foundation (Rideout et al., 2010; Roberts, Foehr, & Rideout, 2005) data for 8- to 18-year-olds as well as in the Common Sense Media (2011) data for 0- to 8-year-old children added yet another layer of difficulty to defining media exposure. When they are multitasking, youth may have a primary and a secondary media activity, such as writing a blog

and listening to music. This kind of exposure is not unlike foreground and background exposure to television or other kinds of video content. *Total media use* was defined by how much time was spent with media, whereas *total media exposure* added extra time to that total when more than one medium was used simultaneously due to multitasking (Roberts et al., 2005).

## Measuring Media Use and Exposure

Seven main methodological approaches have been used to measure media use and exposure (D. R. Anderson & Hanson, 2009; Vandewater & Lee, 2009). *Global time estimates* ask parents, children, or both to estimate overall exposure to various media (e.g., "How many hours did you (or your child) watch television yesterday?"). Diaries include *time-use diaries*, such as the Child Development Supplement (CDS) of the Panel Study of Income Dynamics (PSID), which asks parents of younger children or older children themselves to track and write down all of their media experiences over a period of time (Vandewater & Lee, 2009). *Media diaries* use various approaches such as having parents write down the specific television program a child is viewing in say, 15-minute intervals (e.g., D. R. Anderson et al., 1985). *Direct observations* of behaviors using video equipment are another option, but the cost is prohibitive (D. R. Anderson et al., 1985). *In experience sampling*, youth can carry an electronic device and be randomly contacted at periodic intervals to inquire about what they are doing at that specific moment, but it disrupts participants' ongoing behaviors (Csikszentmihalyi & Kubey, 1981). *Electronic monitors*, such as the Nielsen People Meter, can track who is viewing a specific television program although this kind of methodology is invasive. Similarly, *tracking software* is very accurate and can identify exactly where specific users have gone online (Vandewater & Lee, 2009), but privacy issues are raised (Thornburgh & Lin, 2002).

Although diaries are one of the most accurate measures (D. R. Anderson et al., 1985), the cost effectiveness of global time estimates have made them a method of choice. Indeed, the most comprehensive data on U.S. children's media use and exposure patterns over the past decade have come from nationally representative cross-sectional surveys using global time estimates initially conducted by the Kaiser Family Foundation (Rideout et al., 2010; Rideout & Hamel, 2006; Rideout, Vandewater, & Wartella, 2003; Roberts et al., 2005; Roberts, Foehr, Rideout, & Brodie, 1999) and now Common Sense Media (2011, 2013). These

surveys examined three different cohorts broken into two different age groups: 0- to 6-year-olds (and later 0- to 8-year-olds), and 8- to 18-year-olds. Because these are major sources of ongoing information about children and youth media use and exposure patterns, this age breakout and their survey measure will be used to organize the area of media use and exposure patterns.

### *Media Use for 0- to 8-Year-Old Children*

In the 2013 Common Sense Media survey of 0- to 8-year-old U.S. children's media use patterns, children spent 2 hours, 43 minutes on a typical day with screen media, music, and reading. Exposure to screen media far surpassed music and reading exposure. Specifically, children spent 1 hour, 55 minutes per day using some kind of screen media, but only 28 minutes reading or being read to, and 20 minutes listening to music. Within screen media, watching television and DVDs dominated young children's time, with interactive media use lagging behind.

When age comparisons were conducted, developmental differences were found for exposure to screen media. As seen in Table 10.2, infants spent an average of about one hour with screen media each day, which increased to just

**TABLE 10.2    Average Amount of Time Spent With Media by Age Among 0- to 8-Year-Old U.S. Children on a Typical Day**

|  | Total | 0–1 | 2–4 | 5–8 |
|---|---|---|---|---|
| **Watching TV, DVDs, or videos** | 1:27 | :56 | 1:38 | 1:32 |
| TV on a TV set | :57 | :44[a] | 1:04[b] | :58[a,b] |
| DVDs | :22 | :11[a] | :26[b] | :25[b] |
| TV/videos on a computer | :03 | *[a] | :02[a,b] | :04[b] |
| TV/videos on a mobile device | :05 | :01[a] | :06[b] | :05[a,b] |
| **Reading/being read to** | :28 | :19[a] | :29[a,b] | :32[b] |
| **Listening to music** | :20 | :34[a] | :18[b] | :15[b] |
| **Playing media games** | :23 | :01 | :14 | :41 |
| Console video games | :06 | *[a] | :02[b] | :12[c] |
| Computer games | :05 | *[a] | :03[b] | :09[c] |
| Handheld game player | :04 | :00[a] | :02[a] | :08[b] |
| Playing games on a mobile device | :08 | :01[a] | :07[b] | :12[a,b] |
| **Other computer activities** | :03 | :01 | :03 | :05 |
| Educational software | :02 | :01 | :03 | :02 |
| Homework | :01 | :00[a] | :00[a] | :02[b] |
| Anything else on a computer | * | * | * | :01 |
| **Using other apps on a mobile device** | :02 | * | :03 | :03 |
| **TOTAL SCREEN MEDIA TIME** | 1:55 | :58 | 1:58 | 2:21 |
| **TOTAL MEDIA TIME** | 2:43 | 1:51 | 2:45 | 3:08 |

*Note*. Statistical significance at $p < .05$ is denoted through different letter superscripts. Significance should be read across rows, but is not denoted for summary scores.
*Source:* Common Sense Media (2013), a nonpartisan nonprofit organization (www.commonsense.org).

under 2 hours daily for 2- to 4-year-olds, and almost $2^1/_2$ hours daily for 5- to 8-year-olds. Reading or being read to also increased significantly from the first year of life to Ages 5 to 8 ($M = 19$ minutes versus 32 minutes, respectively); those who were Ages 2 to 4 ($M = 29$ minutes) were not significantly different from the younger or the older age groups. Notice that the overall amount of screen time is higher than time spent reading at all ages, even though the early years are important for the development of language and reading skills. The one area of media exposure that decreased significantly after Age 1 was listening to music.
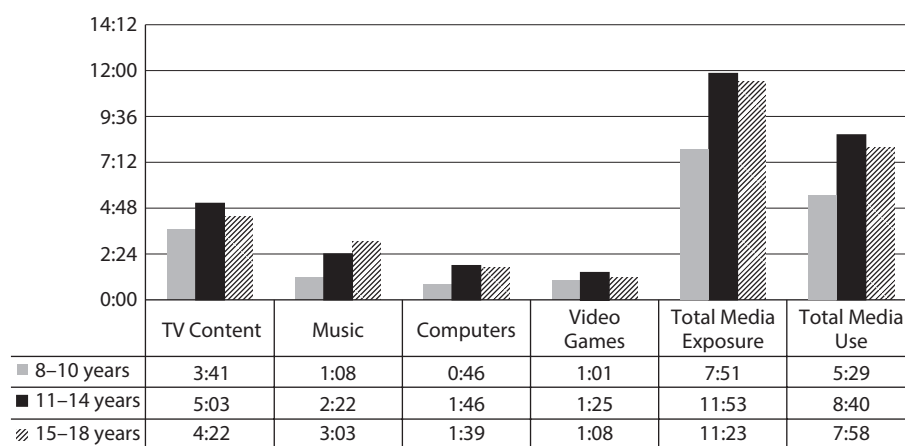
The Common Sense Media (2011) survey also found that parents reported that 16% of 0- to 8-year-olds were multitasking some or most of the time, with the highest rates for 5- to 8-year-old children, 23% of whom multitasked some or most of the time. Approximately twice as many African American (22%) and Latino/a American (21%) than European American (11%) 0- to 8-year-old children multitasked some or most of the time.

Earlier reports from the Kaiser Family Foundation (Rideout et al., 2003; Rideout & Hamel, 2006) found that parents generally had favorable beliefs about the *kind* of media content that their young children used. For instance, 66% of parents reported that they had observed their young children imitating prosocial behaviors, particularly after viewing children's educational television programs. By contrast, only 23% of parents observed their young children imitating aggressive behavior, which was reported more for sons than daughters. Older children imitated content more than younger children did.

Parents also perceived different media differently. In particular, Rideout and Hamel (2006) found that 69% of parents believed that computers helped their children, and 38% of parents viewed television favorably, but only 17% perceived video games favorably. By contrast, only 8% of parents thought that computers hurt their young children compared to 31% who viewed television negatively, and 49% who perceived video games negatively. These differences in attitudes toward technologies may well signify content as well as interactivity differences that their children are experiencing when using these media (Calvert, 2006).

### Media Use and Exposure for 8- to 18-Year-Old Children

For youth who were 8 to 18 years of age, the daily *total media use* averaged 7 hours, 38 minutes (Rideout et al., 2010), more than double that of younger children. When the time spent multitasking was considered separately, *total media exposure* escalated to an average of 10 hours, 45 minutes for older children. Television viewing was by far the most used medium, followed by music, and video games, with print and film being the least used media. Although mobile phone use was an emerging trend, only listening to music, playing games, or watching videos was counted toward media exposure to keep the 2010 report consistent with prior reports. That left out texting and talking on mobile phones as part of the media exposure total, which is a major omission given that 8- to 18-year-olds spent an average of 1 hour, 35 minutes per day texting, and an additional 33 minutes per day talking on mobile phones (Rideout et al., 2010).



| | TV Content | Music | Computers | Video Games | Total Media Exposure | Total Media Use |
|---|---|---|---|---|---|---|
| 8–10 years | 3:41 | 1:08 | 0:46 | 1:01 | 7:51 | 5:29 |
| 11–14 years | 5:03 | 2:22 | 1:46 | 1:25 | 11:53 | 8:40 |
| 15–18 years | 4:22 | 3:03 | 1:39 | 1:08 | 11:23 | 7:58 |

**Figure 10.2**    Media use and exposure by age.

*Source: The Media Family: Electronic Media in the Lives of Infants, Toddlers, Preschoolers and Their Parents*, by V. Rideout, U. Foehr, and D. Roberts, 2010, Menlo Park, CA: Kaiser Family Foundation. Reprinted with permission.

Age differences in total media exposure during the 2010 media study significantly favored older over younger youth. As seen in Figure 10.2, daily *total media exposure* was about 12 hours daily for 11-to 14-year-olds, $11^1/_2$ hours for 15- to 18-year-olds, and "only" about 8 hours per day for 8- to 10-year-olds. Note that these figures are *per day*. The *total media use* figures were close to 9 hours per day for 11- to 14-year-olds, about 8 hours per day for 15- to 18-year-olds, and about $5^1/_2$ hours per day for 8- to 10-year-olds. All age groups spent more time watching television content than any other media activity, though television viewing moved to additional platforms, such as computers and mobile phones. Reading print media was actually more prevalent among younger 8- to 10-year-old children than for 15- to 18-year-old youth, a finding that has striking ramifications for literacy skills in the United States.

In the 2010 media survey, boys' *total daily media exposure* was about 11 hours per day compared to about 10 hours for girls (Rideout et al., 2010). The gender difference was mainly attributable to boys investing more time in gaming on video game consoles or computers than girls did. Girls, by contrast, spent more time with music, print media, and online social networks than boys did. The 2010 gender differences in exposure to music and playing console video games are consistent with prior 2005 patterns (Roberts et al., 2005). In 2010, however, girls spent almost one hour more texting and talking on mobile phones than boys did, which was not counted in total media exposure time (Rideout et al., 2010). Had these figures been included, there would probably have been no gender difference in overall media exposure in 2010.

During the earlier 2005 media survey, increases in *total media exposure* were fueled mainly by multitasking. The authors speculated that $6^1/_2$ hours of daily *total media use* was the peak of what was possible (Roberts et al., 2005). The mobile media that entered children's worlds after that second report, however, proved them to be incorrect, with *total media use* increasing to about $7^1/_2$ hours per day. As electronic media continued to gain more ground in children's *total media use*, reading print media lost ground when compared to the earlier survey (Rideout et al., 2010; Roberts et al., 2005).

African American and Latino/a American youth have more media exposure than European American youth. *Total media exposure* was approximately 13 hours per day for African American and Latino/a American youth, but "only" about $8^1/_2$ hours per day for their European American peers. That is a daily *total media exposure*

increase of almost 4 hours for African American children, about $4^3/_4$ hours for Latino/a American children, and about $1^1/_2$ hours for European American children between 1999 and 2010 (Rideout et al., 2010). Between 2005 and 2010, significant increases were found favoring Latino/a American and African American youth in exposure to music and video game play, and television exposure favoring Latino/a American over African American and European American youth (though African American youth still consumed the most television content at almost 6 hours per day). Ethnic differences in media use patterns were robust, even with numerous statistical controls (Rideout et al., 2010). Differences also appeared in 2010 for using mobile phones to talk, favoring both African American and Latino/a American over European American youth, and in texting, favoring African American over European American youth. By contrast, European American youth read more books than African American or Latino/a American youth did.

Consistent with the Kaiser Family Foundation survey data, diary data from the Panel study of Income Dynamics revealed that African American children spent more time watching television and playing video games than European American or Latino/a American children did. By contrast, European American children viewed more educational television programs than their African American peers, and European American children played more educational computer games than either African American or Latino/a American children (Bickham et al., 2003).

Because electronic media permeated older youths' homes, their experiences were often oriented around media. In 2009, 64% of youth reported that the television set was typically on during meals and 45% of the time when no one was viewing. Only 26% of U.S. 8- to 18-year-olds reported any rules about the music they listened to, only 30% had any rules about the video games they played, 46% had rules about what *kind of program* they could view on television (as compared to 28% who reported rules about *how much* television content they could view), and 52% had rules about what they could do on a computer (Rideout et al., 2010). Daily total media exposure in homes with no rules was higher (almost 13 hours) than in homes with some media rules (almost 10 hours). Few ethnic differences existed in how much time children were allowed to spend with media, but European American children generally had more rules about content than did their African American or Latino/a American peers did.

Taken together, the data suggest that media provide a backdrop in which most U.S. children develop, much of

which is unregulated by their parents. Ethnic minorities are extremely heavy users of electronic media, outpacing their European American peers in adopting and in using all media except for reading books for pleasure and watching educational television programs. The implication is that European American more so than African American and Latino/a American children live in homes that support educational media, a pattern that reinforces an ongoing digital divide in the quality of home media environments. Television viewing, nonetheless, remains the most common experience for U.S. children of all ages, suggesting an ongoing and sustained interest in watching the lives and the stories of others.

## THE DISAPPEARANCE OF QUIET ENVIRONMENTS

Overall, the picture that emerges from children's media access, usage, and exposure patterns is an environment characterized by considerable noise and potential distractions. This noise comes not just from the media that children and youth select, but also from ambient noise that is part of the everyday environment. This noisy world can disrupt children's play and creativity (Schmidt et al., 2008; Valkenburg & Calvert, 2012), their sleep (Thompson & Christakis, 2005), and their concentration (Christakis, Zimmerman, DiGiuseppe, & McCarty, 2004).

### Media, Imaginative Play, Creativity, and Daydreaming

Imagination contributes to positive developmental outcomes, including higher levels of empathy, perspective taking, happiness, and flexibility (D. G. Singer & Singer, 1990). Imagination can be conceptualized as children's imaginative play (also pretend or fantasy play), creative imagination (i.e., creativity), and fantasies. In imaginative play, children transcend the immediate environment and act "as if" they are experiencing another perceptual reality (van der Voort & Valkenburg, 1994). For instance, a child may engage in role-play activities or pretend to be someone else (James & McCain, 1982). Creative imagination can be defined "as the capacity to generate many different novel or unusual ideas" (Valkenburg & Calvert, 2012, p. 158), or as divergent processing (D. G. Singer & Singer, 2005). Involvement in the arts is one area that is used to measure creative imagination (D. R. Anderson et al., 2001), as are tasks that require the generation of numerous novel responses (Valkenburg & van der Voort, 1994). Daydreaming involves the suspension of physical activity while one engages in internal, mental fantasies (Valkenburg & van der Voort, 1995).

A quiet environment is a necessary ingredient for creative imagination to develop as it provides a space to think, to reflect, and to pause during and after busy days (D. G. Singer & Singer, 2005). These kinds of spaces are generally inconsistent with television viewing and more readily found when reading books, thereby increasing the probability of disrupting imaginative play and creativity as electronic media exposure increases (D. G. Singer & Singer, 2005). One can also consider a media diet, in which the quantity of exposure is examined separately from the quality of exposure (D. R. Anderson & Hanson, 2009). Thus, exposure to certain kinds of media and media content could cultivate imagination and creativity.

Two overarching hypotheses have been used to examine the role of media in imaginative play, creativity, and fantasy. These are the *stimulation hypothesis*, in which exposure to media is predicted to increase imagination, and the *reduction hypothesis*, in which exposure to media is predicted to disrupt imagination (Valkenburg & van der Voort, 1994; van der Voort & Valkenburg, 1994).

### *The Stimulation Hypothesis*

In the stimulation hypothesis, media environments provide the raw content that children can subsequently use in their play, their creative tasks, and their internal fantasies (Valkenburg & Calvert, 2012). Most studies on this topic have examined television exposure, which is a limitation of the database, because interactive media are more likely to require children to generate a product than observational media are (Calvert & Valkenburg, 2013). When the quantity of television exposure is examined, the data suggest that children incorporate the content that they view into their fantasy play and their creative products, but the data do not indicate that children are any more imaginative in their play (Shmukler, 1981) or make creative products due to television exposure (e.g., J. L. Singer, Singer, & Rapaczynski, 1984).

A more positive picture emerges for the role of media on imagination when the *quality* of the content that children view is considered. More specifically, educational and prosocial programs that are designed to cultivate creativity and imaginative play, such as *Mister Rogers' Neighborhood* and *Dora the Explorer*, generally do so (Calvert et al., 2007; Friedrich-Cofer, Huston-Stein, McBride-Kipnis, Susman, & Clewett, 1979). Environmental supports, such as having children play about the content, are especially likely to yield beneficial outcomes for imaginative play

(e.g., Friedrich & Stein, 1975). Longitudinal research also finds more creative activities during adolescence for those who viewed more versus less imaginative television programming, such as *Mister Rogers' Neighborhood*, during early childhood, even after including numerous statistical controls (D. R. Anderson et al., 2001).

Exposure to imaginative role models, as predicted by social cognitive theory, is one reason that imaginative play and creativity may increase after exposure to television programs such as *Mister Rogers' Neighborhood*, because Fred Rogers modeled imaginative activities (Valkenburg & Calvert, 2012). The slow pacing and pauses built into some children's programs, which allow time for reflection and interaction, are other possible reasons that certain kinds of media content may promote imaginative play and creativity (Calvert & Valkenburg, 2013).

Lean forward media can also increase imaginative play, particularly with friends. When 10- to 12-year-old children were participating in computer-generated interactions, in this case within a visual and textual multiuser domain (MUD), they sometimes engaged in role playing experiences, such as pretending to shoot imaginary balls at a basketball net, or pretending as if they were drowning at a beach (Calvert, Mahler, Zehnder, Jenkins, & Lee, 2003). Children engaged in role-play activities twice as often when they knew the peer in the MUD than when the peer was a stranger (55% versus 27%, respectively; Calvert, Strouse, Strong, Huffaker, & Lai, 2009).

Youth can also create content on sites that provide opportunities to do so. Scratch, a relatively simple programming language created at MIT, allows children to create their work on their own computer and then post their program in a shared online space. Children who created programs in Scratch also engaged in remixing, in which they build on the products that others have created. In one qualitative study, Brennan, Monroy-Hernandez, and Resnik (2010) described a girl who followed another girl's stories about a hero named Jodie that she had created and represented in words and still-frame visual depictions. As the reader became increasingly interested in the stories, she imagined visual moving images. She contacted the author online and asked if she would like a collaborator who could animate the stories. Hence, the animated stories of the superhero Jodie came to life in 10 episodes through a collaborative team effort. Describing these kinds of collaborative experiences could be informative about how creative group work will take place in the 21st century, as major scientific advances are often now the output of teams of scholars rather than the output of a single individual.

Creative innovation also occurs in the online interactions of youth as they develop and use new language systems in which abbreviated codes represent words, such as *brb* (for be right back) and *lylas* (for love you like a sister) (Calvert, Mahler, et al., 2003; Greenfield & Subrahmanyam, 2003). Coded language, also called Netpeak, includes iconic images called emoticons to express feelings, such as a smiley face 😊, or :-) when text based, to represent happiness, or a frowning face ☹, or >:( when text based, to represent anger (Huffaker & Calvert, 2005).

Daydreaming is more likely to be stimulated than disrupted by television viewing (Valkenburg & van der Voort, 1994). The kind of content that is part of a child's media diet also plays a role in daydreams. For instance, Dutch children who viewed more aggressive television programs reported the most aggressive, heroic content, whereas those who viewed nonviolent children's programs reported more positive content in their daydreams (Valkenburg & van der Voort, 1995).

### The Reduction Hypothesis

According to van der Voort and Valkenburg (1994), television viewing can reduce imaginative play due to *displacement* (viewing television takes time away from participating in imaginative activities), *passivity* (television viewing makes children lazy processors, which is the antithesis of the active involvement required for imaginative activities), *rapid pacing* (television images come and go so quickly that there is no time to reflect, a key component of imaginative activities), *arousal* (television viewing overstimulates children, and hence they become hyperactive and impulsive rather than reflective, which is required for imaginative activities), and *anxiety* (television viewing frightens children, thereby disrupting imaginative activities). The data mainly support *displacement* as the reason that television viewing disrupts imaginative play (van der Voort & Valkenburg, 1994). For example, children shifted about an hour and a half per day of playing to viewing when television was first introduced in the United States (Maccoby, 1951), and children played less when television was introduced in their towns when compared to other towns where children still only had radios (Schramm, Lyle, & Parker, 1961). However, play time increased when television was initially introduced in Australia (Murray & Kippax, 1978) so not all research finds displacement. Background television exposure also decreased the amount of time that 12-, 24-, and 36-month-olds spent playing, partly because looking at the television screen disrupted play (Schmidt et al., 2008).

For creative imagination, Valkenburg and van der Voort (1994) argued that the evidence supported the reduction hypothesis via *visualization* (the ready-made images of television productions disrupt children from making their own images), *arousal* (the rapid pacing in television programming increases impulsiveness and restlessness, thereby disrupting imaginative activities), and *displacement* (television viewing displaces other activities, including imaginative ones). In support of the visualization hypothesis, children typically generated more novel story endings when they listened to radio stories than when they watched stories on television (Greenfield, Farrar, & Beagles-Roos, 1986; Valkenburg & Beentjes, 1997). The arousal hypothesis has not been directly tested, but the foundation of this argument is consistent with the reduction hypothesis. Specifically, viewing violent television programs creates more arousal (Zillmann, 1991), intolerance for delays (Friedrich & Stein, 1973), and restlessness (Singer et al., 1984). The displacement hypothesis has also received support: The longer television was available in a Canadian town, the more creative imagination scores declined (L. F. Harrison & Williams, 1986).

The visualization, passivity, and rapid pacing hypotheses were used to examine potential reduction effects for daydreaming as a function of television exposure. These hypotheses were not supported by empirical studies (Valkenburg & van der Voort, 1994).

### Summary

The extant data suggest that heavy television viewing typically reduces imaginative play and creativity. Television viewing can displace imaginative play, and there is some support for visualization, arousal, and displacement effects for creativity. However, the kind of content viewed also makes a difference, with imaginative programs leading to imaginative play in the short term, and creativity in the long term. Moreover, emerging qualitative data suggest that using interactive media to make content can lead to creative activities. Daydreaming in the form of internally generated fantasies is positively influenced by television viewing, with the kind of content viewed becoming integrated into children's fantasies, but little is known about the role of newer interactive media and daydreaming. The loss of quiet environments *per se* has not been studied as a potential explanation for the reduction hypothesis, even though quiet, reflective time has been proposed as a necessary ingredient for imaginative activities (D. G. Singer & Singer, 2005).

### Media and Sleep Patterns

Sleep disturbances, in the form of later bedtimes, nightmares, and tiredness from lack of sleep, are linked to media use. Paradoxically, many youth use some type of media as sleep aids to help them go to sleep. Approximately 37% of Flemish adolescents reported that they watched television programs to go to sleep, 22% played computer games, 60% listened to music, and 55% read books (Eggermont & Van den Bulck, 2006). Adolescents who relied on television programs, computer games, and music as sleep aids slept less well and reported being more tired than those who read books (Eggermont & Van den Bulck, 2006).

Using time-use diaries from the Child Development Supplement of the Panel Survey of Income Dynamics, Adam, Snell, and Pendry (2007) found that 5.5- to 11.9-year-old U.S. children who watched more television on weekdays had fewer total hours of sleep, although the effect was small. During the weekend, television viewing and playing computer or video games predicted less sleep for younger children as well as older adolescents because of later bedtimes. African American and Latino/a American children slept less than their European American peers did during the weekend, in part due to watching television programs and playing computer and video games (Adam et al., 2007).

One problem in sleep disorders is going to sleep (Mindell, Moline, Zendell, Brown, & Fry, 1994). Exposure to light can alter circadian rhythm cycles that influence when one is awake and when one is asleep (Lewy, Sack, Miller, & Hoban, 1997). In an experimental study comparing young Japanese male adults who were exposed to computer screens that varied in light levels (high or low) and cognitive demand levels (high or low), the cognitive demand, not the brightness of the computer screen, impacted sleep cycles. In particular, delayed sleep latency occurred during the high-cognitive-demand task due to increased heart rates and reported decreases in sleepiness (Higuchi, Motohashi, Liu, & Maeda, 2005), which is consistent with arousal theory. The total amount of REM sleep, which involves dreaming, also decreased during high over low cognitive demands, but again was not influenced by onscreen light levels (Higuchi et al., 2005). These findings suggest that engaging tasks may disrupt sleep onset. The sample for this study was small, and hence, light cannot be ruled out as a distractor when going to sleep.

The noise that comes from audio tracks has not been examined, even though Japanese adolescents reported

falling asleep more quickly when they were in quiet rather than noisy rooms (Alexandru et al., 2006). Loud noises, which periodically occur in television programs and video games, elicit primitive attentional orienting responses to video screens from children who are Ages 4 through 10 (Calvert et al., 1982; Calvert & Gersh, 1987; Calvert & Scott, 1989). The implication is that children who go to sleep with television programs playing in the background may have difficulty staying asleep due to changes in the audio track.

Another potential noise disruption during sleep is a text or a call on a mobile phone. Van den Bulck (2007) found that Finnish adolescents who reported sending or receiving texts on their mobile phones after the lights were out were more likely to report being tired a year later. Although many of these texts were exchanged soon after bedtime, almost one fifth of these youth reported sending or receiving texts at all hours of the night. One possible explanation is that these sleep disruptions could be caused by sounds on mobile phones that alert youth that a text is arriving, thereby interrupting their sleep cycles.

Media diets have also been linked to sleep disturbances. For example, Paaoven, Pennonen, Roine, Valkonen, and Lahikainen (2006) found that Finnish 5- and 6-year-old children who were passively exposed more rather than less often to adult-oriented television programs had more problems with transitions between being awake and asleep as well as more overall sleep problems, even after controlling for socioeconomic status, family conflicts, family income, and the father's work schedule. Consistent with these findings, the kind of program is associated with sleep problems. For instance, exposure to an adult-oriented police series was linked to disorders involving transitions between being asleep and awake. By contrast, links between the quantity of active exposure to child-directed programs and sleep disorders were not significant after controlling for other background variables (Paaoven et al., 2006). Viewing scary content is also linked to sleep problems, as is having a television set in children's bedrooms (Cantor, Byrne, Moyer-Guse, & Riddle, 2010). In short, passive exposure to adult-oriented programs is detrimental to children's sleep as is exposure to scary content, but active exposure to child-oriented programs is not.

Taken together, the data indicate that youth who have electronic media at their fingertips, particularly in their bedrooms throughout the night, sleep less well and have more problems going to sleep and waking up than their peers who read before going to sleep. These problems come from engagement with media content, self-inflicted interruptions in their own sleep cycles when they interact with their peers on devices such as mobile phones, and possibly changes in light or audio levels. Virtually all of the data, however, are correlational.

It seems likely that children's use of electronic media may exacerbate the problems associated with going to and staying asleep, but a potential third factor may underlie this relation: Some youth have difficulties going to sleep in the first place, and hence, elect to use media. Adolescents across numerous cultures report going to bed later as they get older (Crowley, Acebo, & Carskadon, 2007). Their choice to use media at bedtime as a sleep aid may create a self-defeating cycle where youth are more likely to stay awake very late and to sleep poorly because electronic media disrupts rather than aids them in obtaining a restful night of sleep.

Reading a book at bedtime is linked to better sleep, yet if that book is sufficiently engaging, reading could potentially keep youth awake into the wee hours of the morning as well. Those who think too much when going to bed may find some level of distraction useful, with reading a calm or boring book or white noise from another electronic medium providing a pathway to falling asleep. Little empirical work has been directed at this approach.

### Media and Concentration

Multitasking can occur when a child is using various windows within a medium (e.g., listening to music while searching the Internet), with multiple media at a time (e.g., watching television while texting on a mobile phone), or across various media and nonmedia activities (e.g., driving a car while listening to a radio or while texting on a mobile phone). Switching back and forth between tasks can disrupt concentration and even compromise safety. For instance, texting while driving is a problem behavior for adolescents because visual and motor attention are needed both to drive and to text, thereby competing for attentional focus (Halsey, 2012). See Anderson and Kirkorian, Chapter 22, this *Handbook*, Volume 2, for a discussion of media and multitasking.

### THE SOCIAL NATURE OF MEDIA ENVIRONMENTS: ELECTRONIC FRIENDS AND COMMUNICATIONS

Media have always been rooted in social relationships. Book, radio, film, and televised stories communicate

fictional as well as factual stories through oral, written, and visual forms. These stories provide readers, listeners, and viewers with the option to drop into the lives of others, to learn about the everyday social experiences that comprise daily life as well as potential ways to deal with the inevitable conflicts that occur in human interactions.

Mediated communication has also become a norm for social interactions, with social networks like Facebook attracting millions of users who communicate with one another online (Pempek et al., 2009). Although phone conversations have been popular among adolescents for decades, mobile technologies now add opportunities for youth to interact socially with one another through texting and to connect to one another through online interfaces, such as social networking sites. These technological changes make face-to-face interactions less prominent in everyday experiences, supplementing them, or in some cases even displacing them, with mediated communications (Calvert & Wartella, 2014). In addition to the actual people in children's daily worlds, social relationships include parasocial relationships in which children treat media characters as friends, role models that are depicted in programming, and electronic interfaces in which youth link up with their friends as well as with strangers (Calvert, 2013).

## Prosocial Media: "It's a Beautiful Day in the Neighborhood"

Prosocial media involves demonstrating or eliciting socially constructive behaviors (Calvert, 1999), as when Fred Rogers sang about and shared many beautiful days in his neighborhood with his young viewers. The range of behaviors that researchers have included as prosocial, however, has varied considerably (Friedrich-Cofer et al., 1979; Hearold, 1986; Mares & Woodard, 2005). Prosocial behaviors are defined here as socially constructive behaviors, such as positive social interaction skills and altruism, but other definitions will be included when relevant. Most prosocial television content is presented via stories (Calvert & Kotler, 2003).

### Prosocial Content

Prosocial content became prevalent during the 1970s due to pressure on broadcasters to decrease the amount of violent content (Calvert, 1999). In a comparison of the content on children's programs broadcast on CBS, ABC, and NBC to those on PBS, altruism was the most frequently portrayed prosocial behavior, occurring more often in programs broadcast by PBS than by the commercial stations ($M = 9.73$ versus 6.81 acts per half hour; Poulos, Harvey, & Liebert, 1976). Content analyses documented particularly high levels of prosocial content for *Mister Rogers' Neighborhood*, which contained 95% positive reinforcement versus 5% punishment (Coates & Pusser, 1975).

When deregulation of children's programs occurred in the 1980s, prosocial content waned, only to be followed by a reappearance in frequency during the 1990s with the passage of the Children's Television Act (CTA), which required broadcasters to provide educational and informational television content for children (Calvert, 2008b). The Federal Communications Commission (1991), the government agency tasked with enforcing the CTA, defined educational television very broadly, including any kind of content that can advance children's cognitive, informational, or socioemotional needs. When this definition was combined with the FCC implementation of the 3-hour rule, which required each commercial broadcaster to provide a minimum of 3 hours of educational and informational programming per week, prosocial television programs received a boost.

In a sample of television programs that broadcasters designated as educational and informational (E/I) to meet the requirements of the Children's Television Act, Jordan, Schmitt, and Woodard (2001) found that 51% of the programs involved prosocial content about social and emotional lessons. Prosocial lessons included appreciation of self for 0- to 4-year-olds, interpersonal (e.g., cooperation) and intrapersonal lessons (e.g., self-esteem) for 5- to 11-year-olds, and more mature prosocial topics like dating and sexual harassment for 12- to 16-year-olds. The educational strength of these programs was high for 33% of the programs, moderate for 46% of them, and minimal for 21% of them (Jordan et al., 2001).

In 2008, Wilson, Kunkel, and Drogos conducted a content analysis of educational/informational (E/I) television programs using the system previously developed by Jordan et al. (2001). Their report, titled "Educationally/Insufficient," found that the television programs being broadcast for children had become weaker when compared to the earlier analysis (i.e., Jordan et al., 2001). Only 13% of the programs were rated as highly educational, 63% were rated as moderately educational, and 23% were rated as minimally educational. Broadcasters again presented prosocial content to fulfill their public obligation. Almost three-quarters of all episodes in their sample contained a social or emotional lesson, focusing on positive social interactions (26%), self-esteem (18%), self-restraint (12%),

altruism (8%), emotional skills (7%), and acceptance of others (2%) (Wilson et al., 2008).

### *Influences of Prosocial Media on Children's Learning and Behavior*

The early research about the impact of prosocial television often used Bandura's social cognitive theory, predicting that prosocial behaviors are acquired through observational learning just as aggressive behaviors are. In a classic study that examined children's performance of prosocial behaviors, Stein and Friedrich (1972) compared 3- to 5-year-old children's behaviors before and after 9 weeks of exposure to prosocial *Mister Rogers' Neighborhood* episodes, aggressive Superman and Batman cartoons, or to nature films that had neutral content. Children who viewed episodes of *Mister Rogers' Neighborhood* persisted longer at tasks, followed rules better, and tolerated delays better than the other two groups. Those from low- but not high-socioeconomic backgrounds also increased in positive interpersonal behaviors, including cooperation, nurturance, and labeling their feelings. First grade children who viewed a prosocial *Lassi*e episode in which a boy rescued Lassie's puppy also pushed buttons to help dogs who were barking in a kennel more often than children who viewed a *Lassie* episode with neutral content where the boy character took a violin lesson or an episode of the *Brady Bunch* in which there was a seesaw competition (Sprafkin, Liebert, & Poulos, 1975).

Although everyone loves good stories, their meaning can be elusive. Young children are deficient in processing character emotions and motives, key skills for mature story comprehension (W. A. Collins et al., 1978). In particular, 3- to 5-year-olds had difficulty remembering the emotions of television characters at the end of the story (Hayes & Casey, 1992), and 8-year-olds judged character actions, goals, and successful outcomes as equally important in understanding a simple textual narrative story, whereas 11-year-old preadolescents judged the main character's goals and outcomes as more important than the character actions (Van den Broek, 1989). Even adolescents struggle with plot comprehension when viewing a complex film, with those who are more versus less empathic with media characters demonstrating more identification with characters, better plot comprehension, and stronger feelings about the characters (Calvert, Strouse, & Murray, 2006).

Environmental aids, such as role playing and verbal labeling, that are provided by adult experimenters can assist early learning. Girls' learning of prosocial themes increased when an adult provided verbal labels of the program content, and boys' prosocial behaviors increased when an adult provided supplemental role-playing activities with puppets to support the program content (Friedrich & Stein, 1975). Verbal labels delivered by an adult who viewed with children also increased young children's understanding of prosocial program themes (Watkins, Calvert, Huston-Stein, & Wright, 1980) as did advance organizers and intraprogram synopses of central prosocial program content that were embedded in the program (Calvert, Huston, & Wright, 1987; Neuman, Burden, & Holden, 1990). Formal production features like action (i.e., movement) can also improve children's story comprehension by providing a visual code that children can use to supplement more abstract linguistic content (Calvert et al., 1982).

To examine the effectiveness of the programs created to meet the requirements of the Children's Television Act (CTA) on children's learning, Calvert and Kotler (2003) conducted a short-term longitudinal examination of second- to sixth-grade children's learning from their favorite programs, which compared commercial broadcasters, who were required to comply with the CTA, to cable and public broadcasters' offerings who had no such requirement. Prosocial programs were the overwhelming favorites of children. Children, particularly girls, reported many lessons after viewing prosocial programs, including caring about others, helping, honesty, loyalty, persistence, and social interaction skills such as being a good friend. Children learned equally well from their favorite commercial or non-commercial educational television programs, but did not learn as much from their favorite programs that were strictly designed for entertainment. Overall, these findings indicated that children derive measureable benefits from viewing prosocial programs that are part of media-related policies designed to improve children's television programming.

Meta-analyses reveal positive effects after viewing prosocial programs. For example, a meta-analysis of 230 studies conducted by Hearold (1986) indicated strong and enduring effects of viewing prosocial content ($r = .34$). Similarly, a meta-analysis of 34 studies that focused on interpersonal interactions found an overall effect size of $r = .27$ after exposure to prosocial content, with the effects increasing from Age 3 to their peak at Age 7 (Mares & Woodard, 2005).

In contrast to prosocial television programs, studies about gaming experiences that are designed to promote prosocial behavior are relatively rare. One three-pronged study of youth from varying nations, conducted by Gentile

et al. (2009), is an exception. In a longitudinal examination of Japanese 5th (mean age = 10.9 years), 8th (mean age = 13.6 years), and 11th graders (mean age = 16.6 years), exposure to prosocial video games led to increases in prosocial behavior approximately 3 months later. Similarly, a cross-sectional study demonstrated that children who were in secondary school in Singapore (mean age = 13.0 years) who played more prosocial video games were more likely to help, cooperate, share, and demonstrate empathy. Consistent with these findings, an experimental study found that U.S. college students (mean age = 19.2 years) were more likely to help their partner after playing a prosocial than a neutral or a violent video game (Gentile et al., 2009). These findings suggest that there is promise in having children play prosocial video games to promote prosocial behavior.

In summary, prosocial programs can provide valuable life lessons about positive interpersonal and intrapersonal skills, many of which can be translated into behavior. Plot comprehension is important for children to learn prosocial lessons, particularly because many plots with positive outcomes often include conflict before the prosocial resolution occurs (Lovelace & Huston, 1983). Young children often benefit from environmental support from adults in the viewing environment or that are built into the actual program when their understanding of the program is unclear.

## Parasocial Relationships With Media Characters

In the current transmedia environment in which characters traverse multiple offline and online experiences, children and youth have numerous opportunities to create mediated friendships with characters (Calvert & Richards, 2014). Favorite characters are invited into children's homes through television and computer programs as well as through children's play with toys (Bond & Calvert, 2014). Moreover, media characters are almost always available for children as playmates in their homes, even when their real-life peers are not. Popular media characters are also a part of the marketing experiences that target numerous products at children (IOM, 2006). Through these ongoing and sustained experiences, children sometimes form parasocial relationships, particularly with their favorite media characters, which can fill some of children's social and informational needs (Hoffner, 2008).

Little research has been conducted on parasocial relationships during the childhood years, instead relying on the importance of adult role models (Bandura, 1986; Friedrich & Stein, 1973). However, role models involve vertical relationships rather than the horizontal relationships that characterize childhood friendships (Calvert & Richards, 2014). Bond and Calvert (2014) found that parents reported three major components of children's parasocial relationships: *character personification* (e.g., child trusts character; treats character as friend; thinks character has thoughts and emotions); *attachment* (e.g., character makes child feel safe, character's voice soothes child); and *social realism* (e.g., child thinks character is real). Some parasocial relationships emerge because the character directly addresses the audience in a pseudo parasocial interaction (Bond & Calvert, 2014), but parasocial relationships can also emerge when children view characters as they interact with one another onscreen, an observational learning outcome (Calvert, Richards, & Kent, 2014).

Meaningful social relationships with media characters may foster early learning by serving as social partners (Richert, Robb, & Smith, 2011). For instance, 18-month-olds who nurtured a plush puppet version of a character during play over a 3-month period subsequently learned more from a task presented onscreen by that character (Gola, Richards, Lauricella, & Calvert, 2013). Similarly, toddlers who played with and nurtured a personalized interactive character (i.e., programmed to have the same favorite color, foods, etc., as the child) learned more from a subsequent screen-based task than a control group did, but toddlers who had a nonpersonalized interactive character did not (Calvert, Richards, et al., 2014). Taken together, these results suggest that toddlers who treat characters as persons and who nurture them, a behavioral indicator of a parasocial relationship (Gola et al., 2013), subsequently learn more from those characters.

Although characters can become early teachers of children through the social relationships that children form with them, very few apps take advantage of this relationship. To address the role of media characters in toddlers' learning from touch screen devices, Richards and Calvert (2013) developed an experimental app to compare 32-month-olds' belief in the credibility of the familiar *Sesame Street* Elmo character to the unfamiliar Taiwanese DoDo character. The app varied the accuracy of the character's labels of familiar and unfamiliar foods, and then presented novel foods with made-up labels. Children were more likely to choose the previously accurate character for unfamiliar fruits, regardless of prior familiarity with the character. These findings suggest a more advanced style of determining credibility when toddlers use interactive touch screens, as 3-year-olds chose a familiar over an unfamiliar teacher's labels for novel objects portrayed on video, even when the familiar,

trusted teacher had previously labeled the familiar objects incorrectly (P. Harris & Corriveau, 2011).

## Social Media: Being and Staying Connected

The developmental needs of children and adolescents include learning how to interact with peers, make friends, and develop a mature identity (Subrahmanyam et al., 2006). These kinds of developmental advancements require peer interactions, which were initially limited in online experiences because early interactive media platforms only allowed asynchronous communications, such as email, or synchronous communications that were predominantly with strangers, such as chat room experiences (Calvert & Wartella, 2014). Innovative applications and faster Internet speeds enabled the emergence of social networking sites that connected youth with their friends and families rather than with strangers. Social networking sites include MySpace, Facetime, Friendster, Twitter, and Facebook.

Early Internet users visited chat rooms and multiuser domains (which are spaces in which youth can interact in a flexible form or in a game-like fashion that was originally built on a board game) where they assumed personae in which they took on names and identities (Turkle, 1995). Although the flexibility to be anyone that they desired was often embraced by many adults (Turkle, 1995), youth generally communicated who they were online in ways that had been historically important identity markers in offline experiences (Calvert, 2002). For instance, 55% of adolescents disclosed their own age, sex, and location in response to the chat room query a/s/l, i.e., age/sex/location (Subrahmanyam et al., 2006), and often included their ethnicity as well (Tynes, Reynolds, & Greenfield, 2004). Rather than creating a gender- and color-blind society, the Internet became yet another forum in which these same identifiers were typically disclosed (Calvert, 2002).

The early relationships that youth developed with others that they met online were also characterized by weak ties rather than strong ties. Specifically, users who met other people online spent less time together, relationships were more superficial, and less closeness was felt toward them when compared to those who were known through face-to-face interactions, in part because online youth were interacting with strangers rather than with people whom they knew offline (Subrahmanyam, Greenfield, Kraut, & Gross, 2003).

As digital natives, adolescents were among the first to embrace social media to communicate with their friends (Pempek et al., 2009). Eighty percent of U.S. adolescents use at least one social media platform (Lenhart et al., 2011). College students often reported hundreds of friends on their Facebook profiles, and they reported spending most of their time communicating with those friends, particularly those from their high school years who did not attend their current college, thereby addressing the important developmental need of adolescents for friendship formation and maintenance (Pempek et al., 2009).

Twitter is a social networking site that allows users to microblog. Microblogging occurs when users post brief text updates about the events that are happening in their everyday lives, what they are experiencing, and how they are feeling (McFedries, 2007). On Twitter, each entry is limited to 140 characters of text, including emoticons to express their feelings through pictorial icons in their posts. Users of Twitter have the ability to interact with one another by mentioning others in their updates or by reposting original posts from their friends' Twitter feeds. Users can also follow others' tweets, such as those posted by celebrities. By microblogging, youth can communicate and share content quickly in a world that increasingly requires their attention to be divided across multiple tasks. Nearly 20% of adolescents reported regular use of Twitter, double the number of adolescents using Twitter just 2 years earlier (Lenhart et al., 2011). Individuals who interacted with others on Twitter often knew each other offline or had very similar interests (Java, Song, Finin, & Tseng, 2007). Online interaction with real-life friends via social media venues like Twitter can strengthen perceptions of friendship and lead to higher levels of emotional well-being among adolescents (Valkenburg & Peter, 2007).

Social networks have focused mainly on adolescents, but a report by the Joan Ganz Cooney Center (Grimes & Fields, 2012) examined children's use of what they labeled as social networking forums, an expansion of the traditional definition of social networking sites to include virtual worlds and game spaces where millions of children are interacting with one another. To do so, they examined key characteristics of social networking sites and then applied them to children's online activities.

Grimes and Fields (2012) found that children's social networking sites *support communications among participants* by chat bubbles or whispering, as previously done in chat rooms when youth moved from a public forum to a one-on-one instant messaging interaction (Subrahmanyam et al., 2006). Social networking sites have users develop *personal profiles* in which they describe themselves, which tend to be consistent with the real self (Pempek et al., 2009). Children create representations of themselves on children's

sites, such as avatars and virtual pets and dolls. Social networking sites allow users to *leave residues of their online presence in relation to other users on the site*, such as posts, friend lists, and belonging to specific groups. Finally, social networking sites have *hierarchies of access*, such as age restrictions to join Facebook (Grimes & Fields, 2012). This approach to social networking captures the kinds of activities that children are more likely to do with one another online, as children play together more than they post written comments or videos. Research about how younger children interact with one another on these sites is notably absent and needed (Grimes & Fields, 2012).

## THE MEAN AND SCARY WORLD: MEDIA VIOLENCE AND SCARY CONTENT

When rampage killings take place that bear striking similarity to children's media experiences, such as two male adolescents repeatedly playing the videogame *Doom* before attacking their teachers and fellow students, the public and policymakers inevitably ask if media exposure played some role in these deadly execution style killings. Gerbner, Gross, Signorielli, and Morgan (1986) argued that heavy exposure to television content cultivated a view that the world was a mean and scary place due to the amount of violence in programs. Cultivation effects could take place when children are exposed to other kinds of violent media, such as the news. In addition to the scary aspects of violent content, children are exposed to other kinds of scary content, such as supernatural events (Cantor, 2012). Exposure occurs because children select these kinds of experiences, or are exposed to them by another person.

### Media Violence

Children look up to certain people, including media personalities, adopting the behaviors of social models through observational learning (Bandura, 1986). Because of social concerns about the impact of violent content on children's aggression, researchers have systematically tracked the amount of violent content (e.g., Gerbner, 1972; Gerbner, Gross, Morgan, & Signorielli, 1980; Wilson et al., 2002) and conducted systematic studies about the role of violent content on children's antisocial behavior (C. Anderson, Gentile, & Buckley, 2007; Bandura, 1965; Stein & Friedrich, 1972). Social cognitive theory, arousal theory, psychoanalytic theory, cultivation, and script theories have also been used to frame media violence effects.

### *Violent Content*

The selection of one operational definition for violent acts depicted on television has been challenging, with the inclusion of intent used in some definitions, but not in others (see Wilson, 2008). The National Television Violence (NTV) study defined violence as acts or threats of physical force intended to harm other animate beings (Wilson et al., 1997).

In the NTV study, violent content in television programs broadcast on commercial stations, independent stations, PBS, and basic and premium cable were analyzed. From 1994 to 1997, 60% of television programs contained violent content, with PBS having the lowest and premium cable having the highest rates of violence (Wilson et al., 1997, 1998). Sixty-nine percent of children's programs in the sample contained violence, compared to 57% of nonchildren's programs (Wilson et al., 2002). In the NTV study, 90% of films broadcast on television contained violent content (Smith et al., 1998). By contrast, only 15% of music videos contained intentional physical aggression, but only the visual, not the musical track with lyrics, was examined for aggressive content (Smith & Boyson, 2002).

Violent content is also heavily concentrated in video games. Using content analyses, 98% of video games with a Teen (T) rating that entered the market place in 2001 and 64% of video games with an Everyone (E) rating that entered the market place between 1985 and 2000 contained violent content (Haninger & Thompson, 2004; Thompson & Haninger, 2001). Sixty-eight percent of the most popular video games in 1999 contained violent content (Smith et al., 2003). Overall, the data indicate the heavy use of violence in children's media.

### *The Influence of Violent Content on Learning and Social Behavior*

Given the pervasive use of violent content in media, concerns have been raised for decades about how media violence impacts children's aggressive behavior. Experimental studies demonstrated aggressive outcomes after children observed violent actions in films or in television programs (Bandura, 1965; Wilson, 2008). Although questions have been raised about the impact of televised violence in field studies (Freedman, 1984), one of the more influential field studies of televised violence demonstrated aggressive outcomes for young children who were initially above the median in aggressive behaviors (Friedrich & Stein, 1973). Seven meta-analyses also indicated that viewing high concentrations of televised violence contributes to children's antisocial behavior, with effect sizes ranging

from .11 to .31 (median value = .20; Comstock, 2008). Risk factors for aggression included antisocial behavior, disruptive disorder behaviors, poor social relationships, poor psychological well-being, and parents who treated their children in a rigid or indifferent style (Comstock, 2008).

Scholars often point to psychoanalytic theory as the reason that the media industry believes that violent content is harmless (Bushman & Huesmann, 2012). In Freud's version of psychoanalytic theory, people are innately aggressive, and viewing violent content or playing violent video games is predicted to harmlessly drain off those natural tendencies through catharsis (Wilson, 2008). Research demonstrates, however, that viewers become more aroused and more, not less, likely to imitate and enact aggressive actions after exposure to violent content (Calvert, 1999). Jung's ideas of archetypal images, including the hero who is aggressive and prosocial for a just cause, are often used in television and film scripts, as the hero has been a compelling person and character throughout time (Calvert et al., 2001), but studies on this approach are virtually nonexistent.

A challenge in showing heroic portrayals to young children is that they view the world as good or bad, not nuanced, and their plot comprehension is often poor so they do not understand the character's motives (Calvert, 1999; Gunter, 2008). For instance, older boys were more likely to choose helpful than hurtful behavioral options when they understood an episode of a simple cartoon, *Superfriends*, that was presented with a mixed prosocial and aggressive message, but the opposite pattern occurred for younger boys (Liss, Reinhardt, & Fredriksen, 1983). Consistent with these findings, adolescents from the United States and Taiwan who demonstrated poor plot comprehension of a film were more likely to identify with the villain (Calvert, Murray, & Conger, 2004). These findings suggest that improving children's and adolescents' plot comprehension is important for moderating the impact of filmed or televised aggression on their role model choices and their aggressive conduct.

As lean forward media became more standard in homes, children became participants in, not just observers of, violent actions (Calvert & Tan, 1994). Meta-analyses revealed that playing violent video games increased children's aggressive actions, ideation, and feelings and physiological arousal while reducing empathy as well as prosocial actions (C. Anderson et al., 2010). These effects occurred for people in Eastern as well as Western cultures, females as well as males, and in experimental studies for all forms of aggression (C. Anderson et al., 2010). Other meta-analyses, however, have demonstrated minimal effect sizes once controlling for publication bias, in which studies with nonsignificant findings are not published (e.g., Ferguson, 2007).

The Proteus effect describes how individuals are affected by their digital self-representation (Yee & Bailenson, 2007). In a virtual environment, for instance, those who were assigned to be more attractive avatars were more likely to move closer to another's avatar and to reveal more information about themselves than those who were assigned to be an unattractive avatar; similarly, those who were assigned to have taller avatars viewed themselves as more self-confident than those who were assigned to have shorter avatars (Yee & Bailenson, 2007). Building on the research about the Proteus effect, Pena, Hancock, and Merola (2009) primed aggression by having players' avatars wear either black or white cloaks in a virtual world. Those whose avatars wore black coats reported more aggressive attitudes and intentions about their behaviors than those who wore white cloaks (Pena et al., 2009). Playing aggressive video games with a personalized avatar rather than a nonpersonalized avatar also resulted in increased aggressive behavior and arousal by players (Fischer, Kastenmuller, & Greitemeyer, 2010).

Interactive media have made it possible for youth to engage in cyberbullying (Dake, Price, & Maziarz, 2012; Dilberto & Mattey, 2009). Bullying has been defined as repeated, intentional aggressive acts toward another person (Agatston, Kowalski, & Limber, 2007). Cyberbullying involves the same behaviors, but takes place electronically rather than in person. In a survey of young adolescents ($N$ = 3,767), 11% reported being a cyber victim, 4% reported being a cyberbully, and 7% reported being both a cyberbully and a cyber victim (Kowalski & Limber, 2007). In a survey of a nationally representative sample of adolescents ($N$ = 7,182), Wang, Iannotti, and Nansel (2009) found that approximately 14% of these youth reported being bullied electronically in the previous 2 months. Boys were more often cyberbullies, and girls were often cyber victims. African American youth were more likely to be cyberbullies than cyber victims. Adolescents who reported strong parental support were less likely to be cyberbullies or cyber victims, but having a large number of friends was not a protective factor, as is the case for traditional bullying (Wang et al., 2009).

In summary, exposure to media violence can increase aggressive and antisocial behaviors due to arousal, social learning, priming of aggressive responses, and

the development of aggressive scripts and schemas. Little evidence supports the idea of catharsis. Plot comprehension also influences outcomes, thereby making younger children who have poorer plot comprehension skills at risk for antisocial outcomes after viewing aggressive content (Calvert, 1999). Although there is some disagreement about the evidence (e.g., Ferguson, 2007; Freedman, 1984), viewing or interacting with televised violence has been treated as a risk factor for childhood and adolescent aggressive behavior (Wilson, 2008).

### Children's Fright Reactions to Scary Media Content

Viewing things that go bump in the night appeal to many children, in part because they enter the realm of fantasy and find the content arousing and entertaining (Zuckermann, 1979). For younger children, however, the lines between what is real and pretend can be tenuous (Valkenburg & Buijzen, 2008), and exposure to scary fictional and real events can have enduring effects (Cantor, 2012; Riddle, Cantor, Byrne, & Moyer-Guse, 2012).

The literature in this area is based mainly on parent and child surveys, and on retrospective, autobiographical self-reports, as researchers have been reluctant to show scary content to children in experimental studies for ethical reasons (Cantor et al., 2010). According to Cantor et al. (2010), 76% of 5- through 12-year-old children reported being frightened after exposure to media content, mainly by movies.

Three different reasons have been used to describe exposure to scary television and film content: Children actively select scary content, which would be foreground, intentional exposure; because friends, peers, or other family members select scary content, and children just happen to be there, a background exposure effect; and because children just stumble across scary content and watch it. Children reported the most fright when they did not select the content for themselves, instead watching because someone else had selected the program (Cantor, 2012).

Why do children choose to expose themselves to scary media content when it can frighten them? According to Zuckermann (1979), sensation seeking is a main reason for selective exposure as children seek an optimal level of arousal, and scary content is arousing. Cantor and Reilly (1982) found that 80% of adolescents reported that they liked scary media either somewhat or a lot, and boys reported that they liked scary content more than girls did. Seventy-six percent of adolescents reported that they watched scary television content sometimes or often, and 55% reported that they viewed scary movies frequently. Nonetheless, younger adolescents reported that they avoided exposure to scary content more than older adolescents did, and girls reported avoiding scary content more than boys did. Overall, then, there is an audience for scary content, although some children prefer not to view it, and 32% of this sample reported regret for having watched certain scary programs (Cantor & Reilly, 1982).

The kind of program content that children reported being frightened by varies with developmental skills, with children's abilities to separate fantasy and reality playing an important role (Cantor & Hoffner, 1990). Consistent with cognitive developmental theories, such as those advanced by Piaget (1954), parents reported that their children who were under Age 8 were most frightened by content based on the physical appearance of characters, such as viewing depictions of monsters or creatures (Cantor & Sparks, 1984). By contrast, parents reported that their adolescents were more frightened than their younger children were of content that required abstract, conceptual processing, such as movies about a nuclear war (Cantor, Wilson, & Hoffner, 1986). Depictions of supernatural events frighten both children and adults, perhaps because even some adults remain somewhat unsure about whether or not these events could actually happen (Cantor, 2006). Children with the most severe fright reactions to fictional portrayals had a television set in their bedroom (Cantor et al., 2010), suggesting minimal parental supervision (Cantor, 2012).

Riddle et al. (2012) found that approximately 35% of a sample of U.S. 5- to 12-year-olds was frightened by the news, with natural disasters, kidnappings, wars, and burglaries being mentioned the most. Unlike exposure to fictional media events, having a television set in one's bedroom did not predict the likelihood of being frightened by a news depiction for younger or older children, nor did restrictive rules by parents prevent their children's exposure to scary news events, perhaps because this exposure was accidental (Riddle et al., 2012).

The aftermath of viewing extremely scary content ranges from short-term fears to enduring anxiety and fright. Sleep disturbances, such as being afraid to go to sleep or having bad dreams, have been reported after exposure to scary media content (Cantor, 2012; Wilson, 2008). Children have also reported physical problems such as stomachaches or headaches as well as anxiety (Cantor et al., 2010). Lingering fears were reported by approximately 25% of those who had viewed a program that really frightened them (Harrison & Cantor, 1999), such as fears

of swimming after viewing the film *Jaws*, in which a great white shark attacked swimmers at ocean beaches (Cantor et al., 2010).

Although some parents restrict their child's viewing of scary content (Riddle et al., 2012), many parents underestimate how frightened their child is after viewing scary content (Cantor & Reilly, 1982). Strategies for fear reduction vary by age. For young children, behavioral strategies such as holding onto another person or covering or hiding one's eyes behind a pillow are often effective in reducing their fright (Cantor, 2012; K. Harrison & Cantor, 1999; Wilson, 1989). By contrast, older more than younger children cope with scary content by using cognitive strategies, such as telling themselves that the content is not real (K. Harrison & Cantor, 1999). Parents and older siblings also use cognitive and behavioral strategies for younger children in the family who are scared (Cantor & Wilson, 1984; Wilson & Weiss, 1993).

Girls in the United States and Holland reported being more frightened by television content than boys did (Cantor, 2012; Valkenburg, Cantor, & Peeters, 2000; Walma van der Molen & Bushman, 2008). Girls used behavioral approaches for fear reduction more than boys did, but both boys and girls reported the use of cognitive strategies to reduce fear (Valkenburg et al., 2000). The effectiveness of reassuring language depends on children's verbal skills. For instance, children were told that most snakes were not poisonous after exposure to a video excerpt from *Raiders of the Lost Ark* where the protagonists were trapped in a snake pit (Wilson & Cantor, 1987). However, younger children were more likely to focus on the word *poisonous* than on the phrase *not poisonous* (Wilson & Cantor, 1987).

In summary, exposure, particularly inadvertent exposure, to scary stories depicted in media can frighten children. Media content frightens youth of all ages, although the kind of media content that is scariest varies by age. Coping with fear by the youngest viewers involves behavioral strategies whereas cognitive strategies are most effective for older viewers. However, actual events, as portrayed in the news, are not fictional events, and hence, are frightening to children who view events that they cannot control.

Arousal theory provides the best explanation for why children expose themselves intentionally to scary events, some of which have enduring effects on their sleep patterns as well as their everyday behaviors where they avoid certain activities. The findings suggest that media portrayals can lead to phobias when a child is unable to cope with

the content that they have viewed. Research on the effects of books and computer games on fear responses have not been studied, and are an important avenue of future research (Valkenburg & Buijzen, 2008).

## MEDIA, GENDER, AND SEXUALITY

Gender is a multidimensional construct that is a central organizer of human experience (Huston, 1983), in part because gender serves as an organizer of children's identities (Erikson, 1963; Kohlberg, 1966). U.S. media, particularly television portrayals, depict a highly gender-stereotyped reality that is rooted in culture but that also reinforces and exaggerates traditional gender values (Calvert & Huston, 1987; Signorielli, 2012). Gendered beliefs are also used by youth to choose what to view and what they do online (Subrahmanyam et al., 2006).

With the onset of puberty during the preadolescent and adolescent years, changes come in identity as an increased interest takes place in defining oneself as a sexual person (Erikson, 1963). In addition to parents and schools, informal teachers about sex can be abundantly found in media, including both traditional observational media as well as newer interactive interfaces. Media with sexual content is presented in two basic ways: embedded in stories that contain both sexual and nonsexual images and content, and as sexually explicit content that is presented by itself (Wright, Malamuth, & Donnerstein, 2012). In the new online environments in which children and youth move fluidly, youth now generate sexual content and share it in their communications and in peer-to-peer file sharing programs (Lenhart, 2009).

### Gender-Stereotyped Content

The content of media can be examined as *who counts*, in terms of quantity of depictions, and *who matters*, in terms of the quality of the images and roles (Calvert, 1999). Women lag behind men in both categories in television programs. In 2010, women comprised 50.8% and men comprised 49.2% of the U.S. population (U.S. Census, 2011). Although a longitudinal content analysis of the number of male and female characters in television programs demonstrated significant increases in the number of females over the past several decades, from 24% in 1967 to 41% in 2009, men still outnumbered women as television characters in television programs compared to their actual

representation in the U.S. population, and men continued to have more prestigious occupations than women did (Signorielli, 2012). The value of women often comes from their physical appearance rather than their occupation. Content analyses documented that women in popular films were younger than their male counterparts (Lauzen & Dozier, 1999), and women in television depictions were likely to have thin and attractive bodies (Fouts & Burggraf, 2000). Overall, the media depicts men as strong, serious, powerful, and heterosexual, and women as passive and emotional (Hust & Brown, 2008).

Children's programs were especially likely to portray characters in gender-stereotyped ways, where females were emotional and romantic (Calvert & Huston, 1987; Signorielli, 2012), and males were muscular and powerful superheroes (Baker & Raney, 2007). Even female characters who were superheroes were still physically attractive and emotional (Baker & Raney, 2007). Content analyses of children's educational and informational television programs found no differences in the number of male and female characters, but male characters engaged in a wider range of roles than female characters did, and no programs had a female lead character (Barner, 1999). Taken together, the findings suggest that children encounter a world of television that adheres to traditional gendered stereotypes.

## Influences of Media on Gender-Related Processing and Outcomes

Gender schema theory, social cognitive theory, and cognitive developmental theory are the main theoretical approaches that have been used to understand how gender influences children's selective attention, learning, and behaviors after exposure to, or interaction with, media. In gender schema theory, children develop learned expectations that guide perception, memory, and inference, including gender stereotypes (Calvert & Huston, 1987). Because gender is such an important organizer of identity (Martin & Halverson, 1981), children and youth search for content that can guide their constructions of self. These experiences include exposure to role models that can be viewed on television and in films as well as gendered interactions and peer feedback that take place in online experiences. Cognitive developmental theory examines age-related changes in children's understanding of gender, primarily through gender constancy where children come to understand that their biological sex will never change, which then influences their selective attention to social

models (Huston, 1983). Social cognitive theory focuses on the gendered roles that children observe, which they can then imitate (Huston, 1983).

Consistent with gender schema theory, children seek out television content that matches their gender roles. Boys, for instance, were more likely to view cartoons and action-oriented programs in their homes (Huston et al., 1990), whereas girls were more likely to view programs that focused on social and emotional themes (Calvert & Kotler, 2003). Boys who had attained gender constancy were also more likely to view television programs at home that featured male television characters and that involved sports or action adventure content (Luecke-Aleksa et al., 1995). Gender constant boys were preferentially attentive to boys on screen when compared to gender preconstant boys, whereas girls were equally attentive to both male and female characters, regardless of gender constancy attainment (Luecke-Aleksa et al., 1995). Latino/a American 4-year-old boys, who theoretically should not yet be gender constant, were also less likely to identify with the Latino/a American girl character Dora than were European American boys and all girls (Calvert et al., 2007).

Information that is consistent with gender schemas is recalled accurately, but gender schemas can distort memory of televised content so that it is consistent with expectations (Calvert & Huston, 1987). For instance, when children viewed a televised depiction of a female doctor and a male nurse, they remembered the opposite occupational roles for the characters, except for those who had met an actual male nurse (Cordua, McGraw, & Drabman, 1979). Although all 8- and 9-year-old children remembered content that was relevant to gender roles, those who were highly gender-stereotyped remembered less nontraditional role information than those who were less gender stereotyped (List, Collins, & Westby, 1983). Consistent with these findings, grade-school aged children who were heavy versus light television viewers were more likely to believe that gender stereotypical household chores were performed either by men or women (Signorielli & Lears, 1992). Overall, these findings indicate that memory of gender-stereotypical information is generally quite good, but that children who hold and act in more gender stereotypical ways do not remember counter-stereotypical portrayals as well as children who are less gender stereotyped do.

When second- through sixth-grade school children wrote online reports about their favorite educational television program, their reports contained more male than female characters, more male than female pronouns, and

more masculine than feminine behaviors (Calvert, Kotler, Zehnder, & Shockey, 2003). Girls and boys were equally likely to report male characters in their reports, but girls had more female characters in their reports than boys did. Although girls (69%) were more likely than boys (21%) to write about the heroic actions portrayed in the cartoon *The Wild Thornberrys*, which featured a female lead, reports about this program still contained the most language about heroic actions, a traditionally masculine activity (Calvert, Kotler, et al., 2003).

Consistent with social cognitive theory, children also select same-sex role models more so than opposite-sex role models. For instance, when children were asked which media character they would like to be like, boys chose only male characters and girls chose female characters two thirds of the time (Miller & Reeves, 1976). Consistent with these findings, 3-year-old children who were heavy television viewers selected more gender-stereotypical occupations for their futures than light television viewers did (Beuf, 1974). When media presentations of non-traditional roles for women increased, preadolescent girls developed more interest in the occupations that were frequently portrayed except for girls who continued to view programs that had women in more stereotypical professions (Wroblewski & Huston, 1987). These studies suggest that gendered role models and depictions influence children's decisions about whom they want to be like and what kinds of behaviors they are likely to exhibit.

Children bring who they are to online activities, which influences the kinds of behaviors that they do. Two studies described preadolescent children's online interactions when in the same multiuser domain (MUD) on two occasions, which varied whether the pairs knew one another or not (Calvert, Mahler, et al., 2003, Calvert et al., 2009). Boy pairs moved across different scenes and played with one another, and girl pairs chatted with one another through the dialogue box, regardless of whether they knew one another. When paired with an opposite sex peer that they did not know, boys and girls altered their interactions, with boys writing more and playing less, and girls writing less and moving more (Calvert, Mahler, et al., 2003). However, mixed pair interactions were more strained when the pair knew one another, with boys trying to play games with the girls, and girls trying to talk to the boys through the chat function. These problems occurred, in part, due to different gendered communication and interaction styles (Calvert et al., 2009).

Turkle (1997) found that gender bending, in which players present themselves as the opposite biological sex when they are online, was common among adult players who frequent MUDS. In contrast to Turkle's findings, surveys of users who role-played in the MUD LamdaMOO found that 50% of players reported the use of only one identity when online, and of those who reported multiple identities, 75% used only one of those identities over a 2-week time frame (Schiano & White, 1998). Similarly, the evidence on gender bending for children and adolescents is weak. For instance, preadolescents overwhelming selected an avatar that matched their own biological sex and selected a gendered name for their avatar (Calvert, Mahler, et al., 2003; Calvert et al., 2009). Even when engaging in gender bending, girls continued to chat and boys continued to play (Calvert et al., 2009). Gender-typed names were also found in studies of adolescent youth who were interacting in chat rooms (Subrahmanyam et al., 2006).

Consistent with these findings, Gross (2004) found that approximately 10% of U.S. adolescents reported gender bending as a prank, to preserve their privacy, or to gain access to online sites with age restrictions, and they were more likely to gender bend when with others than when alone. Approximately 10% of Dutch preadolescents and adolescents also reported gender bending when online (Valkenburg, Schouten, & Peter, 2005). It appears, then, that most preadolescent and adolescent online users present themselves and act as one person, perhaps because they stay close to the actual parameters that define who they are during that developmental time frame.

Electronic gaming is a highly gendered activity, with males playing more so than females during childhood and adolescence. Yee (2006) conducted a survey of 30,000 users of Massively Multiuser Online Role Playing Games (MMORPGs), which are online worlds that persist independently of specific users. These sites typically contained mostly violent content in the past, but now provide a range of activities for users. In this 3-year study, Yee found that approximately 85% of the users were male. About 25% of the sample was adolescents, and approximately 97% of the users who were under Age 18 were males. Adolescent males tended to use the game for their own personal gain, and also reported that the friendships that they had within the game were as important as those in their offline experiences. Females who played on these sites were older, typically were introduced to them by a romantic partner, and used the game to build supportive social networks as well as to escape. Nearly half of the study participants reported that they were addicted to the MMORPG world, spending an average of 22 hours a week in these online spaces, with 61% of the sample reporting

that they had spent as many as 10 hours of continuous time at their specific MMORPG.

In summary, observational and interactive media typically present content that is gender-stereotyped, and if not stereotyped, children often use media in ways that are gender-stereotyped. Specifically, children select content that fits their own gender-related beliefs, they tend to remember content that is consistent with traditional gender stereotypes well though children who hold more nontraditional beliefs also remember nonstereotypical content, and they play in gender-stereotyped ways when using interactive media. The data suggest that media serve as a reflection of our broader culture, and that children act accordingly.

## Sexual Content

*Embedded* sexual content is often found in televised or film stories. Kunkel, Eyal, Finnerty, Biely, and Donnerstein (2005) conducted a content analysis of the sexual content broadcast on television programs on 10 channels (four commercial stations, one independent station, one public broadcasting station, and four cable stations), excluding children's programs, the news, and sports programs. Sex was defined as depictions and/or talk about sexuality or sexual behavior. Seventy percent of the programs in the sample contained sexual content. Talking about sex occurred more often than sexual behavior did (68% versus 35%, respectively), but explicit sexual presentations were rarely shown. The percentage of programs containing sexual content also increased significantly over time from 56% in 1998, to 64% in 2002, to 70% in 2005. The content that is popular with adolescents rarely included any information about risk factors for being sexually active or how to protect oneself from sexually transmitted diseases or unwanted pregnancies by acting in a sexually responsible way.

Sexual relationships in television programming typically occurred between unmarried partners in ways that were highly gender stereotyped (Kunkel et al., 2005). For instance, men were depicted as wanting sex for recreational reasons, and women were presented as searchers of love and intimacy in enduring relationships where they were the gatekeepers for sexual activity (Hust & Brown, 2008). Heterosexuality was the norm, with limited presentations of gay, lesbian, or transsexual individuals; when portrayals of sexual minorities did occur, they typically did not involve any kind of sexual interactions on broadcast television programs (Hust & Brown, 2008).

Content analyses have not been conducted on online content. Even so, just about any kind of sexual content can be found online, including sadomasochism and rape (Thornburgh & Lin, 2002).

## Influences of Sexual Content on Children

Most of the data about how sexual content influences youth are surveys or reports about accidental exposure because it is illegal to show sexually explicit content to minors in the United States as well as in many other countries. Most of the experimental evidence about how sexual content affects youth comes from college students' exposure to *embedded* sexual content in television programs and films. Theoretically, exposure to sexual content can affect youth through processes such as the construction of sexual scripts, arousal, desensitization, and imitation.

### Stories With Embedded Sexual Content

Youth exposure to sexual content has always been a controversial topic in the U.S. (Jowett, Jarvie, & Fuller, 1996), yet adolescents are likely to select television programs with sexual material as their favorites (Kunkel et al., 2005). As exposure increases, the evidence supports desensitization and/or disinhibition to sexual content as well as the emergence of scripts about sexual behaviors. For example, youth who viewed more television content that involved sex between unmarried partners (Bryant & Rockwell, 1994) and who listened to more music videos demonstrated more acceptance of premarital sex (Greeson & Williams, 1987).

While the direction of the relation is unclear, those who viewed more versus less programs with sexual content also engaged in more sexual activity, and they had more negative views about being a virgin (Brown & Newcomer, 1991). Longitudinal research linked more frequent exposure to televised sexual content to sexual activity within the next year for 12-to 17-year-olds (Collins et al., 2004), and within the next 2 years for 12- to 14-year-olds who had a heavy diet of sexual content via television, movies, music, and magazines, even after controlling for a number of other variables (Brown et al., 2006). Parents who talked to their children about television content had children who were less likely to engage in sexual activity than those whose parents did not talk to them (Peterson, Moore, & Furstenberg, 1991), perhaps because family communication patterns influence how children view sexual activity.

### Sexually Explicit Content

Both experimental and correlational studies demonstrate that males have more sexually aggressive attitudes toward females after exposure to pornography (Wright et al., 2012). The males who are most influenced by these portrayals are predisposed to sexual aggression, and violent content is often mixed with pornographic content (Wright et al., 2012). Longitudinal studies found that Dutch youth who exposed themselves more often to sexually explicit content had more uncertainty about their sexuality, more positive attitudes about casual sex, and were more likely to perceive women as sex objects (Peter & Valkenburg, 2008, 2009).

In an ethnographic study of online teen chat room discussions among anonymous users, Subrahmanyam et al. (2006) found that sexualized nicknames (e.g., RomancBab4U), an expression of identity, were found for approximately 20% of participants. Sexual themes occurred in about 5% of utterances, or at a rate of about one utterance per minute. Those who presented themselves as male engaged in more explicit sexual utterances whereas those who presented themselves as females engaged in more implicit sexual utterances. Although this was a teen chat room, participants reported that their ages ranged from 10 to 24 years, with more explicit and obscene comments made by those who reported being 18 to 24 than those who reported being 10 to 17 years of age. Those who were in a chat room monitored by an adult made fewer explicit sexual or obscene comments than those in an unmonitored chat room, but younger females were also more likely to participate in the monitored rather than the unmonitored chat room (Subrahmanyam et al., 2006), suggesting that girls are more likely to select a protected space from boys when online. Pairing off strategies, in which participants engaged in cyber pick ups by making a sexualized advance with a request to leave a public conversation for a private one, also occur online, which often result in a sexually intimate verbal exchange called "tiny sex" between the pair (Turkle, 1997).

Faster Internet speeds allowed visual as well as verbal communications about sex. *Sexting* involves sending or receiving nude or seminude photos or sexually explicit messages through mobile phones or the Internet in emails or social networking sites (Dake et al., 2012). Sexting takes place in three main ways: between romantic couples; distribution of pictures with others outside of a couple's relationship, which sometimes takes place after an argument between the couple; and between two people in which

at least one person is hoping for a sexual relationship to develop (Lenhart, 2009).

About 4% of 12- to 17-year-old youth reported that they sent and 15% reported receiving a sexually explicit picture on their mobile phones, with older youth reporting more sexting than younger ones (Lenhart, 2009). The National Campaign to Prevent Teen and Unplanned Pregnancies (2010) found that 51% of 13- to 19-year-old girls felt pressured by boys, but only 18% of adolescent boys felt pressured by girls, to send sexts of themselves. Sexting is also associated with risky behaviors, such as more unprotected sexual intercourse, substance abuse, and emotional issues, such as attempted suicide or forced intercourse (Dake et al., 2012).

In summary, access to sexual content is widely available, particularly online where content and activities are less regulated. Adolescents often seek out sexual content, some of which is generated and is distributed by them. These experiences influence adolescents' beliefs and feelings about sexuality and can put them at risk in their sexual interactions with others.

## FROM OUTDOOR TO INDOOR ENVIRONMENTS: THE OBESITY EPIDEMIC

Within the United States, overweight and obesity rates tripled over the past three decades to 21% of 2- to 5-year-olds, 36% of 6- to 11-year-olds, and 34% of 12- to 19-year-olds, with rates particularly high among Latino/a American boys and African American girls (IOM, 2006; U.S. Centers for Disease Control and Prevention, 2012). Increases in overweight and obesity issues are associated with health-related problems, including Type 2 diabetes, heart disease, stroke, and cancer (IOM, 2006), which forecasts long-term health issues for children throughout their lives.

The everyday environments of children are saturated with exposure to unhealthy foods, delivered in part through media (IOM, 2006, 2012). Television advertising reaches millions of children daily, and 1.2 million children visit food websites each month (J. Harris, Speers, Schwartz, & Brownell, 2012). In 2009, food marketers spent $1.79 billion to market to children Ages 2 to 17, a 19.5% drop, adjusted for inflation, from 2006 marketing expenditures (FTC, 2012a). This cost is lower, in part, because marketers decreased their television advertising buys by 19.5% while expanding their marketing presence by 50% in newer media, such as the Internet, mobile phones, and viral

marketing (FTC, 2012a). Online marketing costs less than television advertising does, thereby making it more cost effective (Calvert, 2008a).

Energy balance involves taking in the same number of calories as those that are expended to maintain the same weight (Calvert, Bond, et al., 2014). One risk factor for obesity involves increased exposure and subsequent intake of high caloric foods that are low in nutritional value, much of which is marketed at children through television advertising (IOM, 2006). Another risk factor involves decreased physical activity because of a shift from outdoor activities to sedentary indoor media activities (Calvert, Bond, et al., 2014). These two pathways to obesity are not mutually exclusive, as the shift to indoor activities also increases the probability that youth will be exposed to television advertisements.

### The Content of Food and Beverage Advertisements

Using the U.S. Department of Health and Human Services formula in which foods are classified as Whoa (to be consumed only once in a while or for a special occasion; e.g., sweetened breakfast cereals), Slow (of moderate nutritional value to be consumed sometimes; e.g., sports drinks), and Go (to be consumed anytime; e.g., apples), Kunkel, McKinley, and Wright (2009) evaluated the foods and beverages in television advertising on 139 children's programs that were broadcast on CBS, NBC, ABC, CW, FOX, Nickelodeon, and Cartoon Network. Results indicated that the Whoa category of foods was far more prevalent (68.5%) than either the Slow (31%), or Go (<1%) categories. The use of popular, licensed characters to advertise to children, such as SpongeBob from *SpongeBob SquarePants*, also doubled from 2005 to 2009 (Kunkel et al., 2009). Content analyses of children's favorite websites and food websites documented extensive marketing of unhealthy foods to children, including the use of advergames (i.e., games that are intended to advertise) to attract children (Alvy & Calvert, 2008; J. Harris et al., 2012; Weber, Story, & Harnack, 2006).

### Energy Intake: Media Influences on Children's Diets and Health Outcomes

In a comprehensive analysis of studies conducted on the foods and beverages that are marketed to children and youth, which primarily involved television advertising, researchers found that advertising influenced children's food and beverage preferences, their immediate dietary consumption patterns, and was associated with long-term obesity problems (IOM, 2006). A causal connection between television advertising and obesity could not be drawn because ethical issues prevent experimental studies from being conducted that would deliberately make children overweight or obese. Therefore, the data were correlational. Even so, the data were consistent with the hypothesis that exposure to television advertising is one cause of overweight and obesity problems for children (IOM, 2006). Another review of the literature conducted in the United Kingdom reached a similar conclusion, linking children's exposure to television food advertising to pediatric obesity and overweight issues (see Hastings et al., 2003).

Not surprisingly, studies of online marketing yield similar findings to those reported in television advertising. For instance, 6-year-old children had more difficulty in discriminating advertisements depicted in simulated web pages than 10-year-old children did (Moondore, Blades, Oates, & Blumberg, 2009), just as they have problems in identifying television advertisements from the program content (Calvert, 1999). Similarly, 7- to 12-year-old children, particularly those who reported playing advergames in the past, were more likely to consume snacks of poor nutritional quality after playing advergames that promoted unhealthy foods, but ate more fruits and vegetables if they played an advergame that promoted consumption of healthy foods (J. Harris et al., 2012). Consistent with these findings, 9- and 10-year-old, low-income African American children were more likely to select and consume healthier snacks after playing an advergame in which their Pacman character was rewarded (gained points) for consuming healthier products and punished (lost points) for consuming unhealthy products when compared to peers who played the same advergame with the opposite reinforcement contingencies (Pempek & Calvert, 2009). The findings suggest that children select and consume nutritional or nonnutritional products that are marketed to them via advergames through the simple behavioral principles of vicarious rewards and punishments to their character, yet marketers overwhelmingly promote unhealthy foods online (Calvert, 2008a).

Motivational variables provide a window into how youth use technologies in ways that can lead to positive dietary behaviors. Those who eat breakfast have healthier diets and healthier weights than those who skip breakfast (Sjoberg, Hallberg, Hoglund, & Hulthen, 2003). To improve breakfast consumption, Byrne et al. (2012)

provided motivational incentives to children to eat break-fast through feedback given through children's virtual pets, who were accessed via mobile phones. When children received both positive and negative feedback from their virtual pet, they were twice as likely to eat breakfast as those who received only positive feedback from their pet or those who had no pet at all. In other words, a combination of positive and negative consequences provided maximum feedback and benefit to the child.

## Media-Related Caloric Expenditure

Energy expenditure comes from two main sources: (1) exercise activity thermogenesis, which is typically attributed to healthy lifestyles as it involves daily exercise; and (2) nonexercise activity thermogenesis, or NEAT, which is the most variable form of activity and a likely contributor to the obesity crisis, as obese youth sit about $2^1/_2$ hours more per day than lean youth sit (Levine, Eber-hardt, & Jensen, 1999; Levine, Vander, Hill, & Klesges, 2006). In obesity prevention, every step counts, from running to walking to get a glass of water (Fujiki, Kazakos, Puri, Buddharaju, & Pavlidis, 2008; Levine, Baukol, & Pavlidis, 1999).

Theoretically, media use may lead to overweight and obesity issues by *displacing* more active nonmedia expe-riences with sedentary behaviors. Small or negligible correlations were found, however, between children's television viewing and video game play in relation to their physical activity as nonactive indoor activities, such as board games, were displaced (Vandewater, Bickham, & Lee, 2006). Nor are all media experiences sedentary. Lean-forward media, including mobile media as well as exergames, can provide opportunities for youth to get moving and to track their own energy expenditure through sensor-based technologies (Staiano & Calvert, 2011a, 2011b). Although simply keeping track of an activity yields a change toward positive, recommended choices and action (Kopp, 1988; Nelson, 1977), NEAT is particularly difficult to track. Small, unobtrusive sensor-based devices that sync wirelessly via bluetooth to mobile devices can monitor the number of calories expended during exercise, providing individualized feedback about users' everyday activities without the burden of self-report. This individu-alized, tailored feedback is far more effective for behavior change than nontailored alternatives (Vandelanotte & De Bourdeaudhuij, 2003). Sensor-based capabilities include monitoring for goal setting and game-like elements, including social play.

The term *self-monitoring* refers to activity tracking, often in conjunction with goal setting, for health-related behavior change. An example is a pedometer that can track every step taken. When linked with software, data gathered by sensors can be displayed graphically, charting energy expenditure over time (Consolvo, Klasnja, McDonald, & Landay, 2009; Staiano & Calvert, 2011a). However, self-monitoring alone does not produce long-term, sustain-able change, in part due to boredom with receiving only raw feedback (Y. Lin & Landay, 2008).

Electronic games, on the other hand, can be extremely engaging (Lieberman, 2006), particularly when combined with social feedback from one's peers (Staiano, Abraham, & Calvert, 2013). Competition can increase motivation to play sensor-based games (Fujki et al., 2008; Toscos, Faber, An, & Gandhi, 2006), particularly when compared to soli-tary play (J. Lin, Mamykina, Lindtner, Delajoux, & Strub, 2006). When compared to a nonplaying control group, however, cooperative exergame play at school was effective in producing actual weight loss in a low-income African American sample of obese and overweight adolescents, but competitive exergame play was not (Staiano et al., 2013), and motivation to play was also higher for the cooperative than the competitive exergame group (Staiano, Abraham, & Calvert, 2012). Because the competitive mobile game studies did not examine weight loss, it appears that coop-eration may be a more viable approach for getting children to invest in game play that can lead to long-term physical benefits. However, not all exergame studies obtain weight loss, particularly when conducted for short periods of time at home (Baranowski et al., 2012; Maloney et al., 2012), suggesting the importance of lengthy treatments and social interactions with peers, particularly in school settings.

## Summary

In summary, the kind of media diet that children have is linked to the obesity crisis. Specifically, exposure to food advertising for high caloric, low nutrient foods is associated with overweight and obesity issues more so than the total amount of exposure to media. In addition, activity displacement appears to involve similar kinds of experiences (e.g., watching television rather than playing a video game) rather than television viewing displacing high-energy expenditure sports activities that are played outdoors. Exergames and virtual play with mobile phone games in which children have to move can lead to caloric expenditure and even weight loss, particularly when cooperation is involved. However, mobile phones are not

allowed in many school systems, and exergame play does not always lead to weight loss.

## RISKY MEDIA ENVIRONMENTS: ALCOHOL, TOBACCO, AND ILLEGAL DRUGS

Alcohol, tobacco, and drugs are portrayed and used in varying degrees by artists across diverse kinds of media (Borzekowski & Strasburger, 2008). While regulation of substance use occurs during advertising on television, the stories themselves often embed characters engaging in the use of alcohol and tobacco, thereby providing ample opportunities for youth to observe and potentially imitate behaviors that can be risky for them.

### The Content: Exposure to Risky Behaviors

Both tobacco and alcoholic beverage consumption is prevalent in most media and is generally treated favorably in media depictions (Borzekowski & Strasburger, 2008), with popular media characters involved in drinking alcohol and smoking tobacco. Consequently, role models are being presented who act in ways that could be harmful to child and adolescent health outcomes. Although illicit drug use is presented in movies, it is less likely to be presented in television programs, and when it is, illicit drug use is generally presented unfavorably, which could potentially discourage participation in illegal drug use (Roberts & Christenson, 2000). Video games rarely portray any kind of substance abuse (Haninger & Thompson, 2004). Nevertheless, media role models are plentiful for children to observe and potentially to imitate for all three classes of substance abuse.

### Influences of Exposure to Alcohol, Tobacco, and Illegal Drugs on Children

According to Heatherton and Sargent (2009), adolescents who view movies with characters who smoke are 3 times as likely to try smoking. These conclusions are based on numerous large-scale surveys that use multiple statistical controls, some with longitudinal follow-ups. Both the onset of smoking tobacco (Hanewinkel & Sargent, 2008; Sargent et al., 2001; Sargent et al., 2005) and drinking alcohol (Hanewinkel & Sargent, 2009; Sargent, Wills, Stoolmiller, Gibson, & Gibbons, 2006) increased for U.S. and German youth who had viewed film portrayals where these behaviors had been modeled. Parents who monitored their 9- to 12-year-old children's viewing of movies with

a restricted (R) rating were less likely to try smoking cigarettes or drinking alcohol than those whose parents did not monitor them, suggesting protective factors when parents limit their children's exposure to media content that demonstrates risky behaviors (Dalton et al., 2006).

Adolescents' attitudes about smoking tobacco are influenced by whether their favorite stars smoke (Heatherton & Sargent, 2009). In one longitudinal study (Distefan, Pierce, & Gilpin, 2004), 12- to 15-year-old adolescents who had never smoked named their favorite movie stars. A sample of movies for a 3-year period was also examined for the smoking behaviors of their top 10 favorite stars, tallied separately for boys and girls. One third of the sample group who selected a star who smoked in the movies became smokers, an outcome that was stronger for adolescent girls than for adolescent boys. African American girls were less likely to name a favorite movie star that smoked than were other youth, and content analyses documented that the favorite actors of African Americans girls generally did not smoke onscreen. These findings can be interpreted within social cognitive theory, as role models are more likely to be imitated (Bandura, 1986).

In a survey of marijuana and alcohol use among high school students ($N = 1,211$) from blue-collar neighborhoods, Primack, Kraemer, Fine, and Dalton (2009) found that those who listened to more music were more likely to smoke marijuana, while those who attended more movies were more likely to drink alcoholic beverages. By contrast, those who read more books or played more video games were less likely to smoke marijuana or drink alcohol. The authors speculated that video game or book reading may remove youth from situations that lead to drug and alcohol abuse or reduce their exposure to other media that portray substance abuse.

In summary, the research consistently links exposure to media depictions of alcohol and tobacco with the onset of drinking and smoking among adolescent youth. The results are consistent with decreased inhibitions to smoke and to imitation of role models, as would be predicted by social cognitive theory. Although a variety of statistical controls are used in analyses, the major weakness in this literature is that the studies are correlational in design, thereby limiting inferences about causality. However, experimental studies are not possible because of ethical issues.

## MEDIA POLICY

Numerous professional organizations and government entities, including the U.S. Congress, have advanced and

implemented media policies. Most policies involve ways to address the influences of exposure that is deemed to be harmful to children, such as sex and violence. The First Amendment, guaranteeing freedom of speech, is integral to how U.S. policies are created and implemented (Calvert, 1999).

## Early Media Exposure

The American Academy of Pediatrics (AAP) has advanced policies to prevent or reduce children's exposure to media. In particular, parents are discouraged from letting their children be exposed to screen media prior to Age 2 (AAP, 1999, 2011), to limit screen exposure to no more than 2 hours per day for children over Age 2 (AAP, 2001a), and to have no television sets in children's bedrooms (AAP, 1999, 2001a, 2011). The AAP (2011) also recommended that pediatricians encourage parents to read to their toddlers to promote literacy and cognitive skills. These recommendations were designed to prevent excessive exposure to violence, to improve sleep, and to improve cognitive skills (Evans Schmidt, Bickham, Branner, & Rich, 2008). Such policies make clear that the AAP favors traditional over screen-based learning.

## The V-Chip

The Federal Communications Commission (FCC) has set forth policies to assist parents in controlling the kind of content that their children view. One involves the V-Chip, which is a computer chip installed in television sets that have picture screens 13 inches or larger. Television program ratings, which came into being as a result of the Telecommunications Act of 1996 (Iannotta, 2008), are used to program the V-Chip to block content. One set of television program ratings is based on content: *S* represents sexual content, *D* represents suggestive dialogue, *L* represents profane language, *V* represents violence, and *FV* represents Fantasy Violence, although very few parents use the V-Chip because it is difficult to program (Jordan, 2003).

## Media Violence

The American Psychological Association (1996, 2005) recommended a reduction in violent television and videogame content and the use of technologies, such as the V-Chip, that would enable viewers (or their parents) to control or eliminate youth exposure to media violence. The American Academy of Pediatrics (2001b) targeted media violence presented via television, movies, video games, and music as a risk factor to children's health and argued for a change in children's media environments. Their recommendations included what is being broadcast, parental supervision of children's media exposure, and children's participation in media literacy programs. To reduce the impact of violent content on children's behaviors, the American Academy of Child and Adolescent Psychiatry (2002) recommended that parents reduce their children's exposure to television, consider removing a television set from their children's bedrooms, and refuse to let their children view violent television programs.

## Regulating Sexual Content

The FCC regulates commercial television programs with sexual content and pay services like dialing for pornography, but the FCC has limited jurisdiction over cable programs, as cable operates over private, not public, airwaves (FCC, 2000; Iannotta, 2008). In addition, any regulation of sexual content presented on the Internet is difficult, if not impossible, to enforce due to the international reach of the content provided online (Thornburgh & Lin, 2002).

A National Academies committee led by Thornburg and Lin (2002) presented a range of technological tools, legal approaches, and social and educational strategies that could be implemented to protect children and youth from sexually explicit online content. At a technological level, *filters* that prevent access and *surveillance* software that tracks behavior were recommended as ways to prevent minors from accessing sexually explicit online content. At a legal level, the committee recommended that child pornography laws continue to be aggressively prosecuted and that law enforcement officials systematically enforce existing obscenity laws, which were not being prosecuted on a frequent basis at the time of the report. Educational and social strategies, such as school media literacy programs were recommended, as children's education was deemed essential to instill ethics of responsible choice and to teach children to use technological tools to implement those choices.

One issue that arose during the National Academies committee's report involved the distribution of materials through peer-to-peer file sharing, in which one minor sent a sexually explicit picture to another (Thornburgh & Lin, 2002). This area was viewed as one that would be particularly difficult to address, which indeed has occurred

with online activities such as sexting. Although no federal laws apply to sexting behaviors among minors (Dilberto & Mattey, 2009), state laws have been used to prosecute minors who sext (Dake et al., 2012). Because sexting is technically the production and distribution of child pornography (Lenhart, 2009), minors who are found guilty of sexting have been subject to possible prison sentences or being registered as a sex offender (Dake et al., 2012). The American Psychological Association (2008) recommended that steps be taken to prevent the sexualization of girls, and teaching girls to value themselves for who they are rather than how they look. The sexualization of girls creates an environment that is conducive to activities like sexting (Dake et al., 2012).

Internet applications like Snapchat now reduce the possibility of distributing sexting materials past the intended recipient. Snapchat allows images to be transmitted for 10 seconds or less, as determined by the sender, after which the message is destroyed. This peer-to-peer file sharing application enables youth to transmit sexts to one another with less fear of prosecution or loss of control of the distribution of the images. Nonetheless, the onscreen images can be captured if the recipient is quick, in which case the sender is immediately notified (http://www.snapchat.com/#What-is-snapchat).

## The Commercialization of Childhood

U.S. children live in a highly commercialized environment. The American Psychological Association, the American Medical Association, and the American Academy of Pediatrics have called for the elimination of, or restrictions in, advertisements directed at children under Age 8, as they are deceptive and unfair (Evans Schmidt et al., 2008). These kinds of advertising restrictions have already occurred in other countries such as Australia, Canada, Great Britain, and Sweden (American Psychological Association, 2004). The use of media characters in children's marketing has also been controversial, such as when the characters become part of product-based programs or program-length commercials, in which the intent of the program is to sell toys (Federal Communications Commission, 1974). There have been similar arguments to restrict or eliminate the use of media characters beyond the screen for commercial purposes (Linn, 2004), but policies have not been put into place, in part because toy revenue pays for the creation of programs in the United States (Cahn, Kaligan, & Lyon, 2008) and because of the First Amendment. Youth also create and post online videos about their favorite products on websites like youtube.com, transforming them into active consumers who generate advertising content (Montgomery, 2012).

### Tobacco and Alcohol Advertising

Efforts to restrict television tobacco advertising have been effective. In 1971, The FCC banned tobacco advertisements from television because of potential health hazards (Aufderheide, 1990). The American Medical Association recommended a ban on all tobacco advertising, as tobacco advertisements are still available in other media, such as magazines and online venues (Evans Schmidt et al., 2008). Advertisements for hard liquor also disappeared from television commercials due to a voluntary agreement with the liquor industry, although beer commercials are still abundant, particularly during sports programs (Evans Schmidt et al., 2008). Smokers and drinkers continue to appear in television programs, perhaps creating an even more effective approach for marketing than traditional advertising, as popular characters are smoking and drinking, and these behaviors are not being labeled as potentially dangerous.

### Food Marketing

The products advertised to children have been linked to pediatric health issues, specifically becoming overweight and obese. Based on an evidentiary review of the literature, an Institute of Medicine (2006) committee made ten recommendations, such as food marketers should use their resources to market healthy foods and beverages to children and youth. Dr. J. Michael McGinnis (2008), who chaired the 2006 IOM committee, testified before Congress, finding little progress in the implementation of the ten recommendations. The lack of progress was occurring not just on the industry side, but also on the government end.

### Privacy

The tracking of online youth has been an ongoing privacy concern, as numerous companies track what children are doing online, and use targeted marketing in which online advertisements appear based on the specific interests and preferences of their participants. The 1998 Children's Online Privacy Protection Act (COPPA) gave the Federal Trade Commission (FTC), who regulates interstate commerce in the United States, the authority to create rules that would restrict commercial websites from collecting personally identifying information about minors who are under the age of 13 (Montgomery, 2012). The FTC updated the COPPA policy with amendments that make companies

seek parental permission to capture children's pictures, videos, and geographical location, which are now possible through social networking sites, and added mobile phones, tablets, and online games to the media that had to follow the rules (FTC, 2012b).

### Driving Hazards

In 2012, 39 U.S. states had laws prohibiting texting while driving, and 10 states banned handheld mobile phone use while driving (Governors Highway Safety Association, 2012). With car crashes as the leading cause of adolescent death, a 2012 television media campaign also created the catchy phrase of a "designated texter" to keep the driver focused on the task of driving the car (Halsey, 2012).

### The Children's Television Act

The Children's Television Act is consistent with policies made by health organizations to improve children's well-being through legislation that supports high quality children's television programs (Evans Schmidt et al., 2008). The AAP advises parents to show only educational television programs, which includes prosocial programs (Evans Schmidt et al., 2008). With changes in television to the digital spectrum, the FCC retained the original requirements of the CTA, but created additional guidelines for multicasting, advertising, and website labeling (Calvert, 2008b; Hill-Scott, 2012). In particular, not more than 50% of the E/I programs broadcast can be repeated during a given week on a particular channel, children's websites must be intended for noncommercial use and the primary website content must be related to the program, and the rules of character use and selling by the program host were updated (Hill-Scott, 2012).

### CONCLUSIONS

Electronic media have been with us for less than a century, but in that short window of time they have become integrated into the fabric of our children's lives. While some parents fear that digital media will be detrimental to their children's development, others fear their children will be left behind without it. Perhaps there is a measure of truth in both visions.

Electronic media are ubiquitous, and they are here to stay. Media range in size from very, very large home theaters to very small, mobile smartphones that connect children to each other and to the world around them. Wearable devices, such as smart watches, are now beginning to enter the marketplace (though the character Dick Tracy wore one many, many years ago).

The content is not changing, nor are the developmental issues that children face, but increasingly media are seamlessly integrated across both real and virtual life experiences. For example, children can look out of their Google glasses that allow a window into an electronic web of information, which is enmeshed within their current individualized environment. Alternatively, children's images, actions, and settings can now be embedded in some of the apps and video games that they play. What will reality mean for children as the lines between face-to-face and virtual experiences are increasingly blurred?

Media researchers are challenged to keep pace with this rapidly shifting array of platforms, allowing various affordances to content access, creation, and distribution, and to respond to requests about policy issues. Early development already occurs in a context in which media characters traverse time and space, from the screen to the toy store to the grocery store. Older children increasingly control their own media environments, with relatively little regulation by their parents. In the midst of these changes, some things remain constant. Observational media will ever be a part of our children's lives. Children like to watch, and the stories of others fascinate them. To what extent will children be able to enter those stories in the future, creating their own plots and representing their unique life stories? Who will our children's friends be? For example, what will a social relationship mean as intelligent agents and robots look and increasingly act more as human beings who are children's special friends, able to respond to each one in highly personal ways? Will children prefer these virtual friends to their more difficult real-life ones? Will children forsake their privacy for the ease of gaining quick access to products that they like? Will privacy even be possible in the future, as tracking software increasingly follows children everywhere they go?

With the exception of the Children's Television Act, rarely do policies take advantage of the enormous potential of media to promote constructive behaviors, such as altruism. Instead, most policies focus on problematic issues, such as reducing children's exposure to sex, violence, and advertising, with some policies recommending restricted access to any kind of electronic media. Ideally, media policy should follow research, not precede it. Yet urgent social issues sometimes drive quick policy decisions

instead of policies emerging after a careful, deliberative research process. Even when media policies are grounded in research, the First Amendment prevents many of them from having the kind of teeth in the United States that would be required to make a meaningful difference.

As our media landscape rapidly changes, one thing is certain: Media platforms will continue to evolve. As digital natives, children accept these changes as inevitable (Prensky, 2001), ever willing to explore and to help develop the newest digital innovation. Each successive generation now leaves a unique digital footprint behind them. The question for us is whether we have the vision to leave a digital footprint worthy of our children's futures.

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