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PROFESSIONAL PERSPECTIVES ON DEAFNESS

EVIDENCE AND APPLICATIONS

# AUDITORY (RE)HABILITATION FOR ADOLESCENTS WITH HEARING LOSS

THEORY AND PRACTICE

OXFORD

# **Auditory [Re]Habilitation for Adolescents with Hearing Loss**

PROFESSIONAL PERSPECTIVES ON DEAFNESS: EVIDENCE AND APPLICATIONS

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*Theory and Practice*

Jill Duncan, Ellen A. Rhoades,  
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**Ellen A. Rhoades**

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# **Auditory [Re]Habilitation for Adolescents with Hearing Loss**



# **1 Introduction to Auditory [Re]Habilitation for Adolescents**

There is a growing realization that many adolescents with hearing loss require special attention. Despite the benefits of early diagnosis, early amplification, and early intervention, some adolescents with hearing loss do not achieve age-equivalent developmental milestones (Geers, Tobey, Moog, & Brenner, 2008; Remine, Brown, Care, & Rickards, 2007). The purpose of this book is to assist auditory [re]habilitation practitioners in mitigating the negative effects of hearing loss on the communicative, socio-emotional, and academic performance of adolescents who rely on auditory-based spoken language to communicate. It is essential that adolescents whose parents chose auditory-based spoken language receive systematic, consistent, well-planned, appropriate auditory [re] habilitation.

The use of a visual or signed language can assure communication development and is a respected approach within the field of deaf education (Spencer & Marschark, 2010). Visual/sign language, however, is not the subject of this book. Instead, this book focuses on adolescents

with hearing loss who have auditory-based spoken language as a primary communication goal.

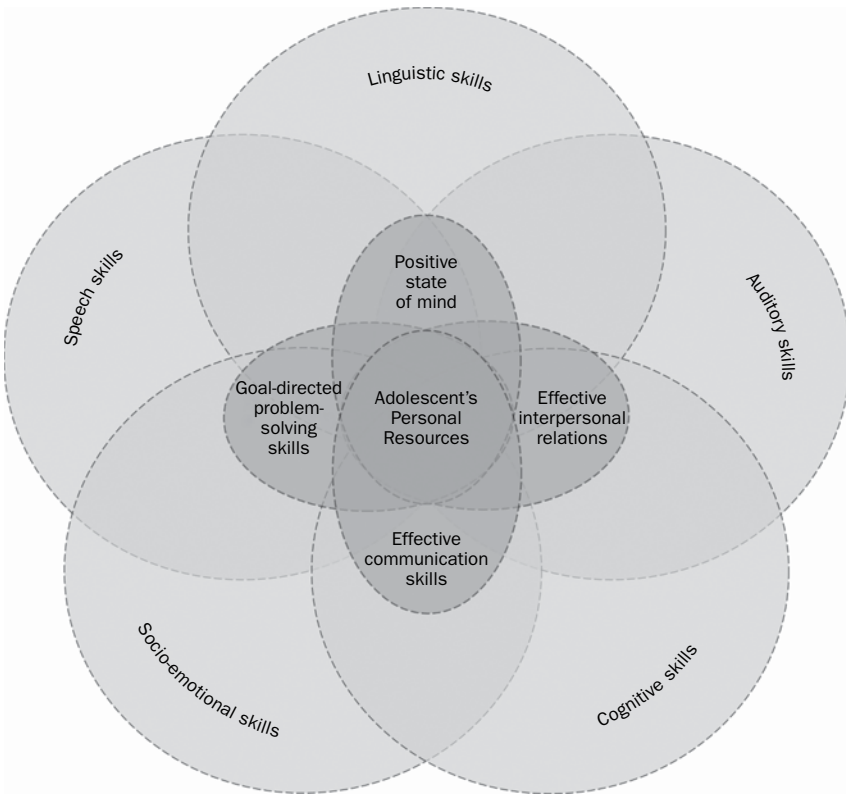
This chapter begins by defining auditory [re]habilitation and its application to adolescents with hearing loss. It follows with a summary of the historical context in which adolescent auditory [re]habilitation has evolved. It then maps incidence and prevalence data. This chapter concludes with a synopsis of subsequent chapters.

## DEFINING AUDITORY [RE]HABILITATION

In this book, auditory [re]habilitation includes all methods used to develop and support auditory-based spoken communication, such as auditory-verbal practice, auditory-oral education, and auditory training. The focus of auditory [re]habilitation has sometimes been limited to learning how to listen, including the discrimination and identification of environmental sounds, identification of speech sounds, identification of words and sentences, and the comprehension of speech in noise (Fifer, 2006). However, the auditory [re]habilitation framework presented in this book is not limited to audition. It incorporates five specific developmental domains—1) spoken communication, 2) auditory skills, 3) speech skills, 4) cognitive skills, and 5) socio-emotional skills. Integrated within this framework is the facilitation of four personal resources—1) a positive state of mind, 2) effective interpersonal relations, 3) functional communication, and 4) goal-directed problem-solving skills. Practitioners are encouraged to engage in ongoing surveillance of all five developmental domains as well as these four personal resources throughout the entire auditory [re]habilitation process (Figure 1.1).

### Adolescents: Unique Population, Unique Services

Adolescence represents a “coming of age” in many cultural contexts, a process that is often turbulent due to the adolescent’s heightened anxiety and stress. Intervention programs for adolescents require different strategies than those for children or adults. The socio-emotional ramifications



**Figure 1.1** Auditory [Re]habilitation Framework

of hearing loss may affect adolescent communication, interpersonal relations, and academic performance. The individualized nature of auditory [re]habilitation may at times rule out the types of group therapy sessions often employed with adults.

The intent of auditory [re]habilitation is to mitigate the negative effects of hearing loss on communicative, socio-emotional, and academic performance for adolescents relying on auditory-based spoken language to communicate. The ultimate goal for practitioners is to enable adolescents to become independent learners in order to facilitate their self-determination.

It is important for practitioners to understand the difference between rehabilitation and habilitation. “Rehabilitation” refers to the restoration and remediation of skills after an illness or injury, while “habilitation”



is the facilitation of a skill yet to be developed (Duncan, Kendrick, McGinnis, & Perigoe, 2010). Practitioners embrace *both* types of intervention within the practice known as *auditory [re]habilitation*. “[Re]habilitation” is used in this book to refer to two groups of adolescents, those who require remediation of skills and those who require development of skills (hence the bracketed prefix). For some adolescents, intervention efforts may target new skills acquisition (development/habilitation), as well as changing certain habits or relearning certain skills (remediation/rehabilitation).

This book refers to individuals with typical hearing as “hearing.” However, it is important to note that adolescents with hearing loss who effectively use appropriate hearing technology may also be viewed as having a functional status of “hearing.” The term “hearing adolescent” is used to refer to individuals who hear within expected normal limits from –10 to 15 dB HL (American Speech Hearing Association, 2012). Bear in mind that, regardless of the advanced hearing technology available, no individual with hearing loss will have “normal” hearing. What current technology offers is the potential for adolescents with moderate to profound hearing loss to hear similarly to those with mild hearing loss. While those with mild to moderate hearing losses can, with appropriate amplification, detect sound within “normal” limits, they will not hear typically; they generally experience greater difficulty in compromised listening situations such as when listening at a distance and in noisy environments (Erber, 2011).

It is important to recognize the range and diversity of achievement amongst adolescents with hearing loss—indeed, like all adolescents. Nevertheless, it is essential that practitioners, families, and adolescents with hearing loss maintain high expectations because developmental outcomes similar to those attained by hearing peers are achievable. Significant improvements in levels of knowledge and functioning, both socio-emotionally and communicatively, are realistic expectations for most adolescents.

Auditory [re]habilitation is a complex discipline based on input from many professions; this necessitates intervention on different levels, each level incorporating a multitude of strategies. Given the uniqueness of

each adolescent, an individualized auditory [re]habilitation program is essential. A variety of practitioners may collaborate in working with adolescents. This often includes an auditory-verbal therapist/educator, an audiologist, a speech-language therapist, a special educator, a social worker, a psychologist, an itinerant teacher of the deaf, or other peripatetic special-education teachers. An interdisciplinary service-provision model that enables sharing of roles between practitioners and across disciplinary boundaries in an effort to maximize communication, interaction, and cooperation among team members is ideal in the context of auditory [re]habilitation for adolescents.

The model presented in this book is such that the case manager of each adolescent's auditory [re]habilitation program is the primary practitioner who routinely delivers services. Case managers work closely with audiologists and other practitioners serving that same adolescent. Additionally, case managers make every attempt to actively involve each adolescent's family in the [re]habilitation process. Case managers offer families extended support to help each adolescent cope socio-emotionally, communicatively, and educationally. However, involving parents at every level of service implementation may not be possible with all adolescents. It is important for case managers to negotiate this issue with each adolescent and family.

Adolescents who may benefit from auditory [re]habilitation may not be in fully inclusive educational environments, but most will receive part of their education within the mainstream school (Opertti & Belalcazar, 2008). Regardless of the setting, practitioners must have expertise in the use of task analysis and empathetic counseling as well as in facilitating listening, speech, spoken language, interpersonal and problem-solving skills.

Practitioners recognize that hearing loss need not result in a negative mindset, ineffectual goal-directed problem solving skills, delayed language, unintelligible speech, insufficient listening skills, or poor interpersonal relations. Hearing loss, per se, is no longer the problematic issue for many adolescents regardless of their mode of communication—particularly if they have reaped the benefits of early diagnosis and family-centered early intervention. Early access to conversational levels

of sound and early effective auditory-based intervention are beneficial to adolescents who rely on spoken language to communicate. For these adolescents, expectations are typically elevated, and higher academic achievements are possible (Most, 2007).

Consideration of functional outcomes, client perspectives, and cost-benefits of therapeutic strategies are important for determining the effectiveness of auditory [re]habilitation (Ratner, 2006). Meaningful accomplishments, such as communicating effectively with peers, are particularly relevant to adolescents with hearing loss; hence the importance of functional language assessments (Tomblin & Hebbeler, 2007).

### *Service Commencement and Termination*

Upon an adolescent's entry into an auditory [re]habilitation program, the agency outlines the conditions of service, including the exit or termination criteria. When adolescents have attained effective spoken communication and good personal resources, there is no need for further auditory [re]habilitation. The sooner parents and adolescents feel they do not require further practitioner assistance, the more competent they will feel (Lipchik, 2002).

## HISTORICAL CONTEXT

During the 1990s, the early identification of children with all degrees and types of hearing loss became more efficient, mostly due to newborn hearing-screening practices and improved audiological evaluation techniques. Moreover, all hearing-related technology considerably improved, positively influencing adolescents' quality of life (Knutson, Wald, Ehlers, & Tyler, 2000). Digital hearing aids and multichannel cochlear implants proved to be highly effective hearing devices for children (Dowell & Cowan, 1997; Niparko, Cheng, & Francis, 2000). Similarly, parents increasingly chose auditory-based spoken communication for their children (Alberg, Tashjian, & Wilson, 2008).

Despite these improvements in technology and practices, both cognitive and socio-emotional functioning of many adolescents with hearing

loss continue to lag behind their hearing peers. Adolescents with hearing loss are often vulnerable on many issues that jeopardize their opportunity to become productive members of society. Stress, anxiety, and other negative experiences can potentially influence the behaviors of many adolescents with hearing loss (Boyd, Knutson, & Dahlstrom, 2000; Kent, 2003; Most, 2007; Schorr, 2006). However, there is a belief that improved auditory-based communication skills can reduce the risks of cognitive and socio-emotional dysfunction (Bat-Chava & Deignan, 2001; Bat-Chava, Martin, & Kosciw, 2005; Durkin & Conti-Ramsden, 2007; Schorr, 2006). This is because spoken-language competence and social skills are important for the inclusion of adolescents with hearing loss in general education programs (Kochkin, Luxford, Northern, Mason, & Tharpe, 2007).

There is a strong need for evidence-based practice (Boothroyd, 2007; Tomblin & Hebbeler, 2007) across all aspects of educational and therapeutic services, partly because funding sources necessitate that delivery of services be cost-effective and outcome-driven. Toward that end, Sweetow and Palmer (2005) conducted an exhaustive review of the auditory [re]habilitation literature, and (although most studies had limitations) the few considered scientifically valid suggested that active listening strategies and speech perception training were useful for adults. Not surprisingly, auditory training has more recently moved to the forefront of auditory [re]habilitation for both adolescents and adults (Kricos & McCarthy, 2007).

Additionally, as reviewed by Rhoades (2006, 2010c), good-quality studies of programs implementing auditory-verbal practice demonstrated positive outcomes for children with significant early-onset hearing loss, including those involving adolescents (Fairgray, Purdy, & Smart, 2010; Schramm, Fitzpatrick, & Séguin, 2002). Such outcomes documented accomplishments attributed to high parent and practitioner expectations, consistent use of appropriate hearing technology, and a focus on auditory-based spoken communication skills. There are comparative data showing that the more auditory the communication mode employed, the better and faster the child's rate of progress in developing spoken language (Geers et al., 2008). Moreover, globalization, with its

trend toward high migration rates, has influenced service delivery. In particular, immigration from less-developed countries has brought multiculturalism, including multilingualism, to [re]habilitation programs in developed countries. This, in turn, has brought about the realization that services designed from a middle-class socioeconomic perspective with majority cultural values may not be as effective for many children who are minority immigrants (Rhoades, 2008; Rhoades, Price, & Perigoe, 2004).

By the beginning of the twenty-first century, the educational, audio-logical, and [re]habilitation landscape dramatically changed. Inclusion became a worldwide movement (Mitchell & Karchmer, 2006); many schools originally established to educate deaf children either closed or reorganized to serve children and youth with multiple learning challenges (Spencer & Marschark, 2010). Additionally, some resource rooms shared by school districts closed so that adolescents could receive services in their respective neighborhoods (Miller, 2008).

Accessibility rights of all people with hearing loss, regardless of their communication mode, are now legislated in many countries. Practitioners around the world are implementing auditory-based teaching behaviors (e.g., Duncan et al., 2010). Adding to this mix is the increase in the number of older children taking advantage of improved hearing technology; these adolescents represent myriad cultural, educational, and communicative backgrounds (Mitchell & Karchmer, 2006).

## POPULATION CHARACTERISTICS

Practitioners use various terms to describe deafness, including *hearing impairment*, *hearing loss*, *hearing deficit*, *hearing defect*, *hearing handicap*, *limited hearing*, *hearing disability*, *deaf*, and *hard of hearing*. Some adolescents may reject these labels due to their potentially negative effects (Leigh, 2009; Richardson, Woodley, & Long, 2004). Similarly, people with hearing loss may also consider terms such as *normal hearing*, *typical hearing*, and *hearing* used to describe people without hearing loss to be

offensive (Rhoades, 2010c). These observations suggest that practitioners should avoid stereotypes and make word choices judiciously.

In incidence and prevalence studies, researchers often group adolescents with grade-school children, so it is difficult to obtain reliable estimates of hearing loss for this particular population. Worldwide, approximately 68 million children and youth under 15 years of age have a hearing loss (Olusanya & Newton, 2007). More than 665,000 babies with moderate, severe, or profound hearing loss are born worldwide each year. The prevalence of childhood hearing loss increases with age, almost doubling the newborn prevalence by nine years of age (Fortnum, Stacey, Barton, & Summerfield, 2007; Olusanya, 2005). It is important to remember that permanent hearing loss can occur at any stage in life.

According to the World Health Organization (2006), the number of people with moderate to severe hearing loss worldwide is estimated to have more than doubled since 1995 to at least 278 million in 2005 (Fortnum et al., 2007), with two-thirds residing in developed countries (World Health Organization, 2002). Immigration increases the number of children with hearing loss in developed countries, due in part to consanguineous marriages (Bener, El Hakeem, & Abdulhadi, 2005; de Nobrega, Weckx, & Juliano, 2005). Nevertheless, the prevalence of profound hearing loss among children may be declining, possibly due to improved public health and reduction of childhood infection (Smith, Bale, & White, 2005).

Based on estimates in the United States, the number of people identified as hard of hearing is ten times greater than the number classified as deaf (Mitchell, 2005). More than 5% of school-age children have a minimal or mild bilateral hearing loss (National Workshop on Mild and Unilateral Hearing Loss, 2005). In addition, unilateral hearing loss affects at least 3% of grade school children (Bess, Dodd-Murphy, & Parker, 1998; Margolis & Saly, 2008). In a population-based study, more than 40% of children with permanent hearing loss, born between 1980 and 2003, exhibited mild bilateral or unilateral hearing loss (Durieux-Smith, Fitzpatrick, & Whittingham, 2008).

The incidence of hearing loss significantly increases when mild hearing loss is included, making hearing loss the most common congenital

disability (Eubanks & Hecht, 2007). The prevalence of milder degrees of hearing loss seems to be increasing (Augustsson & Engstrand, 2006). In summary, it is estimated that hearing loss of all types affects 10%–20% of all children, including adolescents (Kochkin et al., 2007; Teasdale & Sorensen, 2007). Approximately half the cases of hearing loss worldwide are preventable (Kral & O'Donoghue, 2010).

Worldwide, most children with hearing loss now use auditory-based spoken communication (Alberg et al., 2008). Cross-cultural outcome data focusing on children and youth with severe to profound hearing loss and cochlear implants reflect great variability (Geers et al., 2008). Those who become cochlear implant users with auditory access to conversational speech during the first few years of life are increasingly likely to develop linguistic competency, improved cognitive abilities, and higher self-esteem, and to experience full inclusion with peer acceptance (Schorr, 2006; Yucel & Sennaroglu, 2007). However, when all degrees of hearing loss are considered, as few as 12% of children and youth with hearing loss in the United States take advantage of hearing technology (Kochkin et al., 2007), diminishing potential auditory-based spoken communication development and educational outcomes (Ross, 2001; Teasdale & Sorensen, 2007).

While most adolescents with mild, moderate, or unilateral hearing loss depend on spoken communication and receive their education in mainstream settings, there is little outcome data for this subset of the population (Bess, McKinley, & Murphy, 2002). It is evident, however, that some children with mild, moderate, or unilateral hearing loss demonstrate specific cognitive delays or learning differences (Niedzielski, Humeniuk, Blaziak, & Gwizda, 2006; Teasdale & Sorensen, 2007), articulation errors (Huttunen, 2001), or language disorders and delays, particularly in morphosyntax and phonology, persisting into adolescence (Delage & Tuller, 2007). From 30%–37% of children with mild bilateral or unilateral hearing loss fail at least one grade in school—a rate ten times greater than that of their peers with typical hearing (Bess et al., 1998; Bess, Rothpletz, & Dodd-Murphy, 2002). Practitioners, including classroom teachers, acknowledge that mild bilateral or unilateral hearing loss has significant learning consequences for youth (Davis, 2002; Jerger,

2007; Richburg & Goldberg, 2005; Ruscetta, Arjmand, & Pratt, 2005). Unsurprisingly, 50% of these children and adolescents require some type of additional educational support (Bess et al., 1998; Bess, Tharpe, & Gibler, 1986). Noisy environments, such as classrooms, adversely affect listening and learning among children with mild hearing loss (McFadden & Pittman, 2008). In spite of these findings, the effect of mild bilateral or unilateral hearing loss on communication and learning is largely underestimated (Erlandsson, Holmes, Widen, & Bohlin, 2008; Kochkin et al., 2007; Moeller, Tomblin, Yoshinaga-Itano, Connor, & Jerger, 2007).

Hearing loss, even when mild, is potentially fraught with learning, behavioral, and socio-emotional ramifications (Zheng, Caissie, & Comeau, 2003). The social stigma of hearing loss and denial of its existence are primary reasons why many adolescents with hearing loss do not use hearing technology (Kochkin et al., 2007).

Two distinct groups of children and adolescents with hearing loss emerge when considering rate of progress—those who communicate well, not demonstrating language delays, and those who persistently manifest language or literacy difficulties (Edwards, 2007; Geers et al., 2008; Hawker, Ramirez-Inscoe, Bishop, Twomey, O'Donaghue, & Moore, 2008). Several factors may explain persistent communication delays or disorders, including the etiology of the hearing loss (Rajput, Brown, & Bamiou, 2003), the individual's cognitive capacities (Edwards, Frost, & Witham, 2006), socioeconomic status, and late access to clear conversational speech via hearing technology. In many cases, however, variations in outcomes are unexplained, occurring even among adolescents benefiting from early identification, early amplification, and early intervention (Delage & Tuller, 2007; Tremblay, 2005).

## CHAPTER SUMMARIES

This book is divided into fourteen chapters. For the most part, Chapters 2 to 8 are more theoretical in nature, and Chapters 9 to 14 apply theory to practice. The overall aim is to assist practitioners in understanding fundamental adolescent milestones, benchmarking, identifying baselines,



establishing long- and short-term goals, and implementing formal auditory [re]habilitation. The goal is to improve auditory-based practice for adolescents with hearing loss.

Chapter 2, “Developmental Considerations Fundamental to Understanding Adolescents with Hearing Loss” provides practitioners with key milestones considered fundamental to understanding adolescents with hearing loss. The belief is that a current and comprehensive understanding of adolescent physical, neurobiological, socio-emotional, and executive function development will assist practitioners in planning and implementing [re]habilitation goals and selecting useful teaching strategies. Given that as many as 40% of adolescents with hearing loss have an additional medically diagnosed disability (Gallaudet Research Institute, 2008; Hintermair, 2000), the chapter also describes atypical developmental patterns found in some children with hearing loss.

Chapter 3, “Theories, Philosophies, and Perspectives Underpinning Auditory [Re]Habilitation for Adolescents,” presents a review of perspectives underpinning learning and provides a foundation for understanding the auditory [re]habilitation framework described in the subsequent section of this chapter.

Chapter 4, “Auditory [Re]Habilitation Framework and Pedagogical Practices,” provides a pedagogical foundation and some general intervention strategies for both planning and direct face-to-face [re]habilitation with adolescents. It provides practitioners with a layered framework for creating a long-term intervention plan and individual session plans.

Chapter 5, “Audiological Management for Adolescents with Hearing Loss,” contains key concepts necessary to maximize the adolescent’s access to auditory-based spoken communication. This chapter describes characteristics of hearing, followed by a discussion of audibility and auditory learning in relation to candidacy for, fitting with, management of, and evaluation of hearing technology. This chapter highlights special considerations related to the influence of delayed access to hearing on adolescents and associated implications for auditory [re]habilitation.

Chapter 6, “Adolescent Spoken Communication,” summarizes important issues related to the spoken-language development of adolescents and focuses on aspects of communication that are functionally relevant to adolescents with hearing loss. The information in this chapter is essential in planning high-level short- and long-term language goals and scaffolding adolescent learning to ensure optimal auditory-based spoken communication outcomes.

Chapter 7, “Communication Assessment,” discusses types of evaluation and characteristics of assessment instruments. It describes several commonly used assessments across a range of developmental domains. It provides a rationale for assessment within the auditory [re]habilitation context and explains the relationship between assessment outcomes and goal establishment for adolescents.

Chapter 8, “Literacy and Auditory [Re]habilitation,” highlights key literacy constructs and explains predictive variables and issues considered essential to literacy development of students with hearing loss. It also explains the relationship between literacy development, hearing loss, and auditory [re]habilitation and provides practical literacy instructional strategies for this special population.

Chapter 9, “Auditory-Based Communication Skills,” provides strategies for facilitating auditory-based spoken communication skills. It focuses on adaptive coping strategies needed for effective interpersonal relations, along with strategies for effective telephone usage, considered by many adolescents with hearing loss to be the pinnacle of hearing.

Chapter 10, “Adolescents with Hearing Loss: Enhancing Learning Potential via Personal Resources,” discusses the personal resources necessary for facilitating self-determination among adolescents with hearing loss. It provides practitioners with key practical strategies that include promoting a positive state of mind and goal-directed problem-solving skills.

Chapter 11, “Strategies for Facilitating Social Communication of Adolescents with Hearing Loss,” presents strategies for facilitating social communication considered necessary for successful inclusion and interpersonal relationships. It highlights potential barriers to inclusion and

provides practitioners with practical suggestions for improving inclusive practices.

Chapter 12, “Computer-Mediated Communication,” defines digital communication and its importance to adolescents. It also explains types of computer-mediated communication and how digital communication influences education and social connectedness. Strategies for including computer-mediated communication into auditory (re)habilitation are integrated throughout this chapter.

Chapter 13, “Stakeholder Characteristics Influencing the Auditory [Re] Habilitation Process for Adolescents with Hearing Loss,” discusses factors influencing auditory [re]habilitation, both in service delivery and in outcomes. It includes characteristics of families and their adolescent children, as well as of [re]habilitation programs and individual practitioners. It provides suggestions to assist practitioners in delivering family-based auditory [re]habilitation.

Chapter 14, “Case Studies,” provides the application of theory to practice via a demonstration of two case studies.

## KEY MESSAGES

- Hearing loss, regardless of its severity, influences adolescent development.
- The age at which a child acquires access to conversational sound does not explain the great variance in social interactions, spoken communication skills, and academic performance that exists among adolescents with hearing loss.
- There are many possible explanations for the linguistic, speech perception/production, and reading differences found in adolescents with hearing loss.
- Regardless of the type, degree, or nature of their hearing loss, adolescents are at risk of receiving inappropriate educational and/or [re]habilitative services.

- Ramifications of hearing loss range from altering the mode of communication to affecting one's interpersonal relations and one's learning style.
- Given today's hearing technology, improved intervention strategies, and considerably earlier diagnoses of hearing loss in developed countries, auditory-based communication can be a realistic goal for many adolescents.

## **2 Developmental Considerations Fundamental to Understanding Adolescents with Hearing Loss**

Knowledge of adolescent developmental milestones provides a foundation for understanding adolescents with hearing loss, which in turn assists us in planning and implementing auditory [re]habilitation goals and strategies. This chapter provides a brief overview of adolescent physical, neurobiological, socio-emotional, and cognitive development. Following this is a discussion of some selected atypical developmental patterns found in some children with hearing loss.

### **PHYSICAL DEVELOPMENT**

Humans have a long adolescence, with obvious physical changes marking its onset. However, the end of adolescence is difficult to determine, partly because it has no externally identifiable physical change and partly because of socio-cultural inconsistencies in marking adulthood (Luyckx, Soenens, Berzonsky, Vansteenkiste, & Goossens, 2007). No universally

accepted criteria indicate the end of adolescence. One view is that adolescence ends when youth attain psychosocial maturation (Luyckx et al., 2007). Another is that it ends when neurobiological maturation reaches its peak in one's mid-twenties (Giedd, 2008). Legal entities dictate that it ends when an individual can vote, marry, drink alcohol, or is of military conscription age. These legal definitions are problematic because each marker occurs at different ages in different countries. Still another indicator of the end of adolescence is economic independence (Biggart & Kovacheva, 2006). Regardless, most agree that adolescence includes the second decade of life, representing the last phase of child development before adulthood.

The rate of physical growth during adolescence is more rapid than at any other time, except during fetal development and the first years of life. Physical change, including the start of puberty or sexual maturation, represents the onset of adolescence as a series of biological milestones that culminates in the adolescent's ability to reproduce. Despite expected variability in pubertal onset, the progression through pubertal stages is predictable (Eaves, Silberg, Foley, Bulik, Maes, Erkanli, et al., 2004). Physical growth is the most noticeable transformation that accompanies the onset of puberty. For females, the sex hormones produced in great quantity are estrogens and progesterone that cause breast development, pubic and underarm hair growth, widening hips, and menarche. Female puberty begins anywhere from 8 to 13 years of age, its length ranging from 1½ to 6 years (Midyett, Moore, & Jacobson, 2003). Female adolescents of African ancestry typically attain sexual maturation earlier than females of other racial groups (Parent, Teilmann, Juul, Skakkebaek, Toppari, & Bourguignon, 2003). For males, the testosterone hormone dramatically increases, which is closely associated with an increase in aggression. Testosterone produces growth of testes, penis, pubic hair, capacity for ejaculation, height growth spurts, voice changes, and facial and body hair growth. Male puberty begins anywhere from 9 to 14 years, and is completed in two to six years (Pamecha, 2008). Male body composition, particularly muscle bulk, increases until the individual is about 25 years old (Mauras, 2006).

Pubertal hormones generate other significant physical changes. For example, oil, sweat, and odor glands become more active, which can result in acne and body odor (Berger, 2005). Stress-related hormones rise immediately following puberty (Walker, 2002). Growth spurts coincide with rapid increase in fat cells and digestive system capacity; thus, adolescents need more food. As the adolescent larynx grows, the voice drops to a lower fundamental frequency (pitch); more so for males (Berger, 2005). While ocular control seems to be fully developed by the onset of adolescence, the balance function is not fully developed until the end of adolescence (Ferber-Viart, Ionescu, Morlet, Froehlich, & Dubreuil, 2007; Valente, 2007). Asynchronicity characterizes adolescent growth; that is, different body parts mature at different rates, yet there is a regular order in which growth of body parts occurs. Uneven growth rates can be unsettling for the adolescent. Visible changes may alter the adolescent's self-perceptions (Berger, 2005).

Although adolescents typically need approximately nine hours of sleep daily, many are sleep-deprived (Fischer, Radošević-Vidacek, Koscec, Teixeira, Moreno, & Lowden, 2008). Adolescent secretion of melatonin, the hormone that the brain produces for sleep, peaks two hours later than that of a child or adult. Upon reaching late adolescence, melatonin production begins to reflect that of an adult. Early start times for school and extended weekend sleep cycles, coupled with late-night media usage and homework assignments, complicate adolescent sleep practices (Menna-Barreto & Wey, 2008).

## NEUROBIOLOGICAL DEVELOPMENT

Understanding functional brain development in adolescents can have profound consequences for educational, clinical, and social practices (Johnson, 2003). Dynamic and dramatic changes in brain anatomy occur throughout adolescence. Adolescence represents the second most pronounced period of neuroplasticity where the brain is prepared for increased learning. Due to significant cortical reorganization, there is great potential for remodeling the brain. New neurons

grow, particularly in the adolescent brain area considered critical for learning and memory; learning complex tasks, in turn, further facilitates neuronal growth (Waddell & Shors, 2008). The brain develops new neural networks and discards unused neurons; overall, neural connectivity becomes more efficient. The rate and intensity of this pruning and myelination persist across adolescence (Giedd, 2008). Synaptic pruning during post-pubescent adolescence enables effective learning (Giedd, 2008). The peak of synaptic density in the prefrontal cortex is a critical measure of adolescent neuroplasticity (Thomas & Johnson, 2008).

The brain's frontal lobe permits responsible, future-focused behavior. Within this lobe is the prefrontal cortex, often referred to as the "executive of the brain." The prefrontal cortex affects adolescent attention, memory, planning, strategizing, and organizing—all of which affect goal-directed problem-solving, decision-making, risk-taking behaviors, and learning (Kagan & Baird, 2004). The prefrontal cortex, the last brain area to mature, undergoes the most pronounced course of structural development during adolescence.

For all adolescents, external stimuli such as family dynamics, educational experiences, peer relationships, and stressors affect all brain structures. Given that brain maturation is an experience-dependent process, the adolescent brain is highly susceptible to environmental stimuli (Blakemore, 2007). As summarized by Rhoades (2009), all stimuli, and the lack thereof, affect both the structure and the function of the adolescent brain. It is important to resist the temptation to generalize adolescent development—particularly neurobiological development. Practitioners take into consideration environmental stimuli when benchmarking adolescent progress and formulating both long- and short-term auditory [re] habilitation goals.

## EXECUTIVE FUNCTIONING DEVELOPMENT

Executive functioning is an evolving complex construct that provides a framework for learning and behavioral processes. It is a constellation

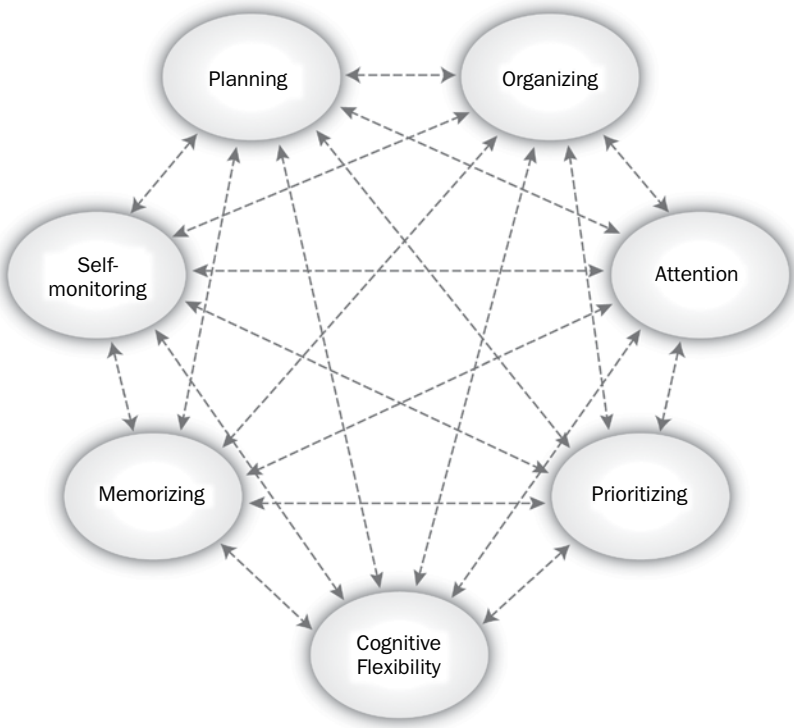


of assorted and interrelated cognitive control skills essential for coordinating thoughts and actions so that effective problem-solving occurs. “Executive functioning” refers to a set of processes associated with purposeful goal-directed behaviors. It includes the ability to make rapid and flexible behavioral adjustments, responding appropriately to varying demands of different situations that can include multi-tasking. Executive capacities interact with more fundamental brain processes and behaviors such as sensory perception and language.

First occurring in infancy, executive functioning develops continuously until emerging adulthood. Adolescents have the capacity to hold more multidimensional concepts and to think more strategically than younger school-age children (Dawson & Guare, 2009). Across adolescence, executive functioning is associated with progressively greater efficiency of cognitive capabilities (Casey, Getz, & Galvan, 2008). Adolescent executive functioning affects academic and socio-emotional functioning (Miller, 2005). The rate at which adolescents process information also increases with age. For example, the rate of processing speech influences how fast an adolescent notices details of a stimulus and related thinking (Rice & Dolgin, 2005).

Executive processes encompass a range of interrelated meta-cognitive and self-regulatory skills (see Figure 2.1) that includes different types of attention, working memory, task management, and self-control. Executive functioning also includes task initiation, persistence, cognitive flexibility, planning, organizing, strategizing, making judgments and decisions, monitoring and evaluation abilities, and coordination of affect and cognition (Dawson & Guare, 2003; Miller & Cohen, 2001).

Of the executive processes, however, those having to do with attention and memory are central to all cognitive activities. Complex cognitive skills influence many behavioral domains and modalities, enabling goal-directed problem-solving behaviors necessary for guiding daily functioning (Anderson, Anderson, Northam, Jacobs, & Catroppa, 2001). Good executive control in one domain, such as emotion, does not ensure good executive control in other domains of functioning. Executive capacities, not necessarily consistent across all activities (Dawson & Guare, 2009), develop differentially across adolescence (Anderson et al., 2001;



**Figure 2.1** Executive Capacities

Huizinga, Dolan, & van der Molen, 2006). Sleep deprivation, emotional stress, dehydration, and physical inactivity can significantly impair adolescent executive functioning (Giedd, 2008). Adolescents execute most executive processes unconsciously, even though it is possible, and sometimes encouraged, for them to purposefully engage and improve these skills (Ylvisaker et al., 2001). However, awareness of executive functioning necessitates strong meta-cognition and self-regulation as well as the coordination of affect and cognition (Miller & Cohen, 2001).

Meta-cognition, a constellation of executive functions, is a complex cognitive control construct often referred to as “thinking about thinking” which involves information known about learning and recollection. Meta-cognition includes reflection, planning, and execution of goal-oriented acts—essentially an awareness of oneself in the learning process (Flavell, 1979). Because meta-cognitive competencies tend to

improve with age, particularly attentional control and processing speed, as well as planning and problem-solving skills (Anderson et al., 2001), adolescent abilities to analyze, predict, evaluate, and monitor learning strategies progressively mature.

Adolescent executive functioning follows a developmental sequence that varies across domains. For example, maintaining and manipulating multiple spatial and verbal units does not typically develop until pre-adolescence (Lehto, Juujarvi, Kooistra, & Pulkinnen, 2003). Visual-spatial and verbal working memories continue developing across adolescence (Huizinga et al., 2006; Luna, 2004), reaching peak capacity at approximately 20 years of age (Siegel, 1994). Strategic self-organization develops around the onset of late adolescence.

Working memory involves reorganizing known information in order to achieve a cognitive goal. There are relationships between working memory and advanced cognition (Capon, Handley, & Dennis, 2003; Morrison, Dumas, & Richland, 2006) and attention (Gathercole, Alloway, Kirkwood, Elliott, Holmes, & Hilton, 2008). More specifically, there is a strong association between working memory capacity and an expressive vocabulary (Henry & MacLean, 2003), reading comprehension (Savage, Cornish, Manly, & Hollis, 2006), problem solving (Swanson, 2006), some measures of intelligence (Engle, 2002), and listening and written expression (Singer & Bashir, 1999). Adolescents with poor working memory may seem forgetful, miss instructions, or fail to complete tasks (Miller, 2005). Stressful situations and stress hormones hamper working memory, even for capable students (Beilock & Carr, 2005; Lupien, Maheu, Tu, Fiocco, & Schramek, 2007).

“Working memory” should not be confused with “short-term auditory memory” (Engle, 2002), the latter not being cognitively loaded, hence not supported by the prefrontal cortex. Of limited capacity, the short-term auditory memory span peaks during early adolescence at about 11 years of age (Siegel, 1994) when its capacity is approximately four categorical unconnected chunks of information. Memory span for verbal contents depends on a variety of factors. For example, adolescents typically have an auditory memory span for seven unrelated digits, six unrelated letters,

and five unrelated words (Miller, 1956). (See Chapter 10 for strategies used to enhance problem solving and memory.)

Self-regulation, another constellation of executive functions, is also a complex cognitive control construct whereby the frontal lobe adopts an increasingly regulatory role across adolescence (Yurgelun-Todd, 2007). The core of self-regulation is the ability to inhibit initial or habitual impulses (Lehto et al., 2003), sometimes referred to as “effortful self-control” of action and emotion. Self-regulation involves complex skills that include initiation and cessation of activities, postponement of action, resistance to temptation, and engaging in socially approved behaviors without external monitors. It also involves modulating the frequency, intensity, and duration of one’s speech/language and motor acts. Large developmental shifts in self-regulation occur during adolescence; adolescents can intentionally improve their self-regulatory processes as they mature (Gestdottir & Lerner, 2007).

“Cognitive flexibility,” the ability to shift and transition between activities or thoughts, is an important capacity within the constellation of self-regulatory executive processes. Some adolescents experience difficulty with cognitive flexibility. Adolescents with learning disabilities may be cognitively rigid, often having difficulty adjusting to a change in plans without distress (Dawson & Guare, 2009). Adolescents who are distractible or have attention deficits may shift activities too quickly or without reflection (Ellis, Rothbart, & Posner, 2004). Some may be impulsive and have difficulty inhibiting inappropriate actions, while others may be day-dreamers and have difficulty inhibiting their thoughts according to the situation (Tamm, Menon, & Reiss, 2002).

## SOCIO-EMOTIONAL DEVELOPMENT

Socio-emotional development during adolescence develops along with improved cognitive control, social awareness, and emotional competence (Burnett, Bird, Moll, Frith, & Blakemore, 2009). Recognizing that some skills are culture-specific, the following section focuses on behaviors tending to be cross-cultural.

Social and emotional development are bi-directional—each influences the other (Rottenberg & Gotlib, 2004). “Socio-emotional functioning” refers to behaviors affected by interpersonal relations and emotional competence. “Interpersonal relations” refers to social interactions, primarily with the adolescent’s family and peers. “Emotional competence” is the ability to discern emotions, to understand the social consequences of emotionally expressive behavior, and to regulate one’s emotional states—all considered essential for successful interpersonal relations in everyday life (Bandura, 2006). With maturation, adolescents transfer their emotional attachment from parents to peers in a process called “individuation” (Hay & Ashman, 2003). However, individuation does not negate emotional ties with parents, since adolescents typically rely on parents for advice as well as emotional and financial support.

Socio-emotional competence in adolescence is associated with academic achievement and peer acceptance (Wentzel, Filisetti, & Looney, 2007). It is important that adolescents develop such prosocial skills as sharing, helping, and other cooperative forms of behavior. The underpinnings of prosocial behaviors include empathy, perspective taking, levels of moral reasoning, and affective functioning (Wentzel et al., 2007).

Adolescents’ vulnerabilities to mental health problems exist regardless of their race or ethnicity, socioeconomic status, or gender (Gutman & Eccles, 2007). This is often due to the nature of adolescent brain maturation and how its neurobiological factors react to stress (Andersen & Teicher, 2008). “Stressors” are negative life experiences creating threats to one’s social connectedness, sense of self, and personal resources (Kemeny, 2003), thus impairing the ability to learn and remember (Shors, 2004). During puberty, stress-related hormones influence the brain (Romeo & McEwen, 2006). Chronic stress from poor parent–child attachment, ongoing family conflict, lack of parental monitoring or emotional closeness, sustained loneliness, and repetitive victimization can negatively influence adolescent mental and physical health (Kemeny, 2003) or predict adolescent delinquency and substance abuse (Gutman & Eccles, 2007; Smetana, Campione-Barr, & Metzger, 2006). Although adolescents’ genetic code is not altered, genetic expression can be altered by events of

psychological importance (Isankova, Renthal, Kumar, & Nestler, 2007). Stressors influence the development and maintenance of executive functioning during adolescence (Riggs et al., 2006). In short, stress changes the brain (Taylor et al., 2008).

There is spillover between home and school functioning in some adolescents' daily lives; stress engenders reciprocity. For example, family stressors can negatively influence academic achievement, and academic difficulties can exacerbate family stressors (Flook & Fuligni, 2008). As many as one-third of secondary school students report high levels of daily stress, yet the frequency with which they employ coping strategies is low (de Anda et al., 2000). Although both sexes rely on parents for support in coping with stressful situations, males tend to be more problem-focused and self-reliant than females, who tend to be more emotion-focused, relying more on peers; this suggests a causal factor as to why males tend to have higher self-esteem than do females (Kessler, Chiu, Demler, & Walters, 2005).

Anxiety disorders, the most prevalent of mental health disorders, often begin in late childhood, while approximately half of mood disorders begin by age 14 (Kessler et al., 2005). Although adolescents in general are particularly vulnerable to depression, there are higher levels of depression among females in middle adolescence, and lower levels of self-esteem in late adolescence (Gutman & Eccles, 2007). On the other hand, there are higher levels of delinquency and substance abuse as well as impulse disorders among males, peaking in early to middle adolescence (Kessler et al., 2005).

Although it may seem unrelated to auditory [re]habilitation, it is important for practitioners to understand that all adolescents progress through a process of identity formation—regardless of the presence or absence of a disability; hence the importance of understanding adolescent sexual orientation. Adolescents are at high risk for mental health problems if they are not open or do not fully understanding their gender identity and sexual orientation. Between 2%–10% of adults prefer same-sex relationships (Berger, 2005). It is more difficult to estimate the percentage of adolescents who are not heterosexual, because many fail to report and many are uncertain of their sexual preference. Males generally

recognize their homosexuality during adolescence, but the same is not true for females (Rice & Dolgin, 2005).

Eating disorders, often associated with long-term affective disorders, is a chronic illness affecting many adolescent females. Effects of severe weight-control practices can have serious, irreversible effects on the adolescent's neurobiological system. With an appropriate long-term interdisciplinary approach to treatment, most can recover. Primary barriers to recovery are insufficient treatment and resistant or ambivalent families (Goldman & Fristoe, 2001).

There is considerable evidence regarding the rate and pattern of psychopathological development across adolescence. First, major depressive disorders increase in frequency, more so among females. Second, criminal behavior markedly rises and leads to conviction and incarceration; this is a frequent outcome of some early disruptive and antisocial behaviors. Third, attempted suicide rates peak in late adolescence. Fourth, the use of illicit drugs rises and peaks between ages 18 and 21. Fifth, overt schizophrenic psychoses become progressively more frequent during late adolescence. There are diverse mediating mechanisms causing adolescent psychopathology, and no single explanation for it exists. Causal pathways are likely to incorporate neurobiological changes and interpersonal interactions, both current and historical (Andersen & Teicher, 2008).

### Identity Formation

Identity construction is a lifelong, relational, fluid, and multifaceted process with development occurring during emerging adulthood (Azmitia, Syed, & Radmacher, 2008; Wortham, 2008). Identity formation develops, in part, through a process whereby adolescents assess and reassess the self, adopting an ideological stance and aligning it with that of their parents (Knafo & Schwartz, 2004). Parents affect how early adolescents approach this challenge (Berzonsky, 2004).

Three styles of identity exploration are noted (Duriez, Soenens, & Beyers, 2004): 1) adolescents with an information-oriented style, tending to be achievers who seek out and evaluate relevant information; 2) adolescents

with a normative style, tending to rely on parents and other authority figures for identity issues; 3) adolescents with a diffuse-avoidant style, tending to avoid personal issues by procrastinating in decision-making, which results in fragmented or confused identity structures (Smits, Soenens, Luyckx, Duriez, Berzonsky, & Goossens, 2008). Some adolescents have fragmented or incomplete identities if their parents are insensitive to their need to explore alternatives (Luyckx, Soenens, Berzonsky, Vansteenkiste, & Goossens, 2007).

Generalizations about self-identity formation across cultures are avoided. For example, some people in Western countries may stereotype Asian youth in thinking they do not have individual selves because of their collectivist social orientations. However, research shows that Chinese urban adolescents also have multidimensional self-concepts that include individualized learning selves (Li, 2006). Some Asian adolescents have greater autonomous or independent academic self-concepts than do Western youth, even though the latter may be more interdependent in social self-concepts. It is possible, however, that Asian children internalize well-developed goals of learning prior to adolescence (Li, 2006).

## Self-Esteem

Adolescence is a period of role restructuring, searching for the self, heightened self-consciousness, and susceptibility to peer influence (Sebastian, Burnett, & Blakemore, 2008). Adolescents become more self-aware and self-reflective (Blakemore, den Ouden, Choudhury, & Frith, 2007). Perception of self is different from perception of others. Typically, young adolescents are already accurate in determining peer perceptions of their behavior, social status, and ability (Malloy, Albright, & Scarpati, 2007). Adolescents engage in introspection via immersion in their own emotions and cognitions while at the same time using external observations of their peers. These internal (self) and external (peer) asymmetrical perceptions lead adolescents to judge themselves and their own behavior differently from how they judge others (Pronin, 2008).



“Self-esteem,” also referred to as “self-worth,” is an interpersonal global construct consisting of overall self-perception of an evaluative affective nature. Self-esteem is the summary evaluation of one’s own worthiness as a human being and, as such, forms the core of one’s personality. Adolescents with a positive sense of self-regard consider themselves to have many good qualities and would not want to change places with others. On the other hand, adolescents with low global self-esteem maintain an unfavorable emotional view of themselves, perhaps feeling like a failure, and are more likely to engage in harmful or negative behaviors (Rice & Dolgin, 2005).

Self-esteem is a predictor of happiness (Furnham & Cheng, 2000). Academic and social competencies as well as one’s physical appearance seem to have the greatest influence on global self-esteem (Hay & Ashman, 2003). A positive self-esteem is important for the identity-construction process, enabling adolescents to cope with stressful life situations (Crawford, 2007; Jambor & Elliott, 2005). It is important to note that self-esteem may decrease during early- to mid-adolescence and rise during late adolescence (Robins & Trzesniewski, 2005). Further, female adolescents’ self-esteem tends to decrease more than males’ (Macek & Jezek, 2007). The overall drop in self-esteem during early- to mid-adolescence is often attributed to more negative views of body image, emerging capacity for abstract thought, increased self-awareness, and to entering a more socially complex academic situation (Robins & Trzesniewski, 2005). Adolescents from minority groups who develop strong self-identity exhibit more positive self-esteem by emerging adulthood (French, Seidman, Allen, & Aber, 2006).

Historical factors influence self-esteem. For example, an adolescent’s global sense of self-worth may depend largely on how that adolescent was disciplined as a child (Furnham & Cheng, 2000). Thus, adolescent self-esteem can shape behavior apart from peer pressure and parental ministrations. Although adolescent reliance on parental support is not gender-specific, males tend to rely on parents as their preferred source of support more so than females, who may prefer peer support (Byrne, 2000). Across cultures and regardless of gender, parents and parenting styles influence adolescent self-esteem, even as peers take on a more

important role during adolescence (DeHart, Pelham, & Tennen 2006). The importance of nurturing parents does not diminish during adolescence. Rather, the nature of the parent–adolescent relationship changes, so that parents serve more as advisors and friends. Parents provide significant reference points that validate adolescent behavior and self-esteem. As children enter adolescence, if their self-esteem is associated with problematic peer relations and poor academic performance, then their family life can provide psychological relief (Reynolds & Repetti, 2008).

Peers exert critical influence on adolescent self-esteem and emotional stability (Hay & Ashman, 2003), more so for females than males (Macek & Jezek, 2007). During middle to late adolescence, peers tend to provide a support system independent of the parental support system (Macek & Jezek, 2007). Adolescents progressively rely on their peers to become more autonomous.

### Perspective Taking

“Intentional thinking” or “mentalizing” is the capacity to understand the mental state of oneself and others; this is also known as “theory of mind.” Its neural basis becomes more refined across adolescence; that is, the efficiency and strategy of emotional perspective taking seems to develop concurrently with the maturation of the prefrontal cortex (Blakemore et al., 2007; Moriguchi, Ohnishi, Mori, Matsuda, & Komaki, 2007). A person must first attend to and then develop some knowledge of people before understanding, anticipation, and prediction of another’s mental state can occur (Frith & Frith, 2006). By the onset of adolescence, children typically understand social blunders, with females tending to be one to two years ahead of males (Baron-Cohen, 2003). Prior to the onset of late adolescence, they are able to predict what others are thinking, again with females being more advanced than males (Baron-Cohen, 2003). Across adolescence, due to improvement in such executive capacities as working memory and response inhibition, there are changes in higher-level strategies for the use of theory of mind or mentalizing (Dumontheil et al., 2010).

Perspective taking involves the ability to recognize, understand, and attribute the mental states or emotions of self and others and is one aspect of theory of mind (Frith & Frith, 2006). When an adolescent understands the behavior of another as a product of the other person's mental state, that adolescent understands false beliefs (misunderstandings resulting from incorrect reasoning), discerns the intentions of others, predicts and explains the behaviors of others, while making inferences about the person's knowledge or beliefs (Dumontheil, Apperly, & Blakemore, 2010). Mentalizing includes the capacity to recognize one's own mental state and to know the mental state as distinct from behavior. These abilities improve with age and are critical for healthy socio-emotional functioning (Baron-Cohen, 2003). (See Chapters 6 and 11 for additional mentalizing information.) Perspective taking, in particular, enables adolescents to infer what others believe about the world given their current point of view (Frith & Frith, 2006).

Understanding the meaning of a remark beyond what is explicitly stated tends to improve across adolescence; understanding speaker belief, intent, and attitude underlies this ability (Pexman & Glenwright, 2007). Ironic or sarcastic comments are essential components of successful adolescent social communication with peers (Wang, Lee, Sigman, & Dapretto, 2006). The development of irony and sarcasm requires mentalizing skills, and sufficient social knowledge of non-literal language such as teasing (Pexman & Glenwright, 2007). To facilitate social communication comprehension, adolescents integrate multiple cues that include paralinguistic information obtained from facial expression, tone, and tempo of voice integral to ironic comments (Wang et al., 2006). As mentalizing increases across adolescence, efforts and reaction times decrease (Choudhury, Blakemore, & Charman, 2006). Appropriate mentalizing is critical for effective adolescent socio-emotional relationships. By onset of adulthood, basic reasoning about mental states is generally automatic.

## Empathy

"Empathy," the emotional aspect of perspective taking, is an essential and intuitive component of socio-emotional functioning (Lamm, Batson, &

Decety, 2007). Empathy plays a role in moral development and judgmental behavior (Blair & Blair, 2009). It requires the understanding of how another individual feels, implying support of another (Decety & Lamm, 2006). While empathy develops from early childhood and across adolescence, there seems to be an interruption at puberty, during which time there is a reduction in accuracy (Blakemore & Choudhury, 2006), but by middle adolescence, emotional responses are modulated with relative ease (Choudhury et al., 2006). Recognizing or reading the emotional cues of others improves over time, becoming relatively easy beyond puberty. Without appropriate emotional self-regulatory skills, adolescents may not adequately modify emotional expressions according to the situation, and there may be confusion between one's own and another's feelings.

There are gender differences in empathy (Schulte-Rather, Markowitsch, Shah, Fink, & Piefke, 2008). Adolescent females typically show greater social sensitivity and emotion recognition than do males in that they are more likely to be adept at ascertaining emotional messages behind spoken statements (Imaizumi, Homma, Ozawa, Maruishi, & Muranaka, 2004). Male adolescents tend to be more skillful at minimizing emotions having to do with vulnerability, guilt, fear, and hurt (Schulte-Rather et al., 2008). Gender differences in empathy have implications for adolescent conversations: Males tend to talk about things, and females tend to talk about emotional connections. Males tend to be systemizers (Baron-Cohen, 2003); that is, they understand how things work, so are more inclined toward logical explanations or inductive processes. Females tend to be empathizers; that is, they attend more to people, are more socially compliant and more adept at mentalizing (Baron-Cohen, 2003).

### Adolescent Risk Factors and Protective Factors

Adolescent growth and adaptability and any associated problems do not abruptly appear at puberty, but are built upon a foundation of earlier relationships and experiences. Adolescent health risk factors include family, peer, or school problems; developmental-behavioral problems, substance

misuse, early sexual activity, and risk-taking behaviors (Kieling et al., 2011). Three primary health factors serve to protect adolescents: 1) family support and family connectedness; 2) peer relationships, peer modeling, and awareness of peer norms; and 3) educational participation (Viner, Ozer, Denny, Marmot, Resnick, Fatusi, et al., 2012). Family and peer relationships are addressed here, and educational participation is discussed in Chapter 9.

### *Family Relationships*

Adolescents with high peer and parent attachment tend to be well adjusted (Laible, Carlo, & Raffaelli, 2000). Centrality of home and school is undeniable, yet adolescents also identify home and school as primary sources of stress and concern (de Anda, Baroni, Boskin, Buchwald, Morgan, Ow, et al., 2000). Changing family relations influence adolescent development (Biggart & Kovacheva, 2006). The extent of adolescent participation in family decision-making can have long-standing effects on academic attainment, self-perceptions, executive functioning, and problematic behaviors such as delinquency and substance abuse (Gutman & Sameroff, 2004). Family decision-making seems affected more by the family's socioeconomic status and environmental situation than by race or ethnicity (Seginer, Shoyer, Hossessi, & Tannous, 2007).

There are commonalities within families across most cultures: 1) adolescents progressively demand increased autonomy and self-regulation, which parents progressively provide; 2) adolescents establish the importance of privacy with regard to their personal domain; and 3) certain elements of individualism are respected by some parents (Nucci, Hasebe, & Lins-Dyer, 2005). The personal domain represents the zone of individuality where primary decision-making belongs to the adolescent in the areas of choice of friends, food, hair style, music, and diary contents. Across age, gender, and culture, adolescents and parents often disagree about the extent to which autonomy is allowed in these personal domains (Daddis, 2008). Fortunately, expectations between parents and adolescents gradually converge with time (Zimmer-Gembeck & Locke, 2007).

Sibling relationships, mediated by such factors as parental hostility, family economics, gender, birth order, and age, can significantly affect adolescents (Williams, Conger, & Blozis, 2007). High levels of sibling conflict can occur in early adolescence, diminishing in middle and late adolescence. Early adolescents tend to have more conflicts with siblings than with anyone else, except with their mother (Smetana, Campione-Barr, & Metzger, 2006). Sibling bonds are important because positive sibling relationships are associated with less loneliness, less depression, less substance abuse, and fewer delinquent behaviors (Yeh & Lempers, 2004).

### *Peer Relationships*

Peers are a powerful force throughout adolescence (Bouchard, Wang, & Beauregard, 2012). Peer acceptance and group membership, complex dimensions within the adolescent school experience, are critical (Durkin & Conti-Ramsden, 2007). Adolescents turn to peers for attachment-related functions such as comfort, trust, loyalty, and intimacy during stressful and non-stressful periods (Laible, Carlo, & Roesch, 2004). Friends tend to affirm each other's positive qualities and downplay inadequacies, thus confirming each other's self-worth (Ladd & Troop-Gordon, 2003). Friends also maintain similar beliefs about personal authority regarding their zone of privacy (Daddis, 2008). The development of trust is essential for appropriate and meaningful adolescent social interactions (Zak, 2008).

Adolescent peers can be passionate, emotional, and turbulent (Steinberg & Morris, 2001), attributes that enable them to cope with life stressors (Byrne, 2000). While friends can influence adolescents in such positive ways as modeling academic achievement and prosocial behaviors, they can also influence adolescents in negative ways such as engaging in substance abuse and delinquency. Gender segregation is nearly universal during early adolescence (Rose & Rudolph, 2006). Peer influence is strongest in middle rather than early or late adolescence (Steinberg & Morris, 2001).

There are two important subgroups of peer relationships: friendship dyads and groups. The friendship dyad, assumedly based on equality and reciprocity, typically involves peers with similar personality characteristics, where females display greater intimacy than do males (Brown & Klute, 2006). Although dyadic friendships are associated with academic resources (Levy-Tossman, Kaplan, & Assor, 2007), they are not always equal or reciprocal. Reciprocal friendships, associated with a sense of school belongingness and higher academic outcomes, mean that expectations and norms are similar and that both friends are emotionally supportive of each other (Vaquera & Kao, 2008). The influential nature of dyadic friendships is not necessarily constant over time (Giordano, 2003).

Group peer systems often include multiple friendship dyads nested within multiple layers of cliques and crowds (Cillessen, 2007). "Cliques" are small interaction-based groups, each made up of four to six adolescents, that tend to involve strong emotional cohesiveness and high levels of intimate sharing (Brown & Klute, 2006). By late adolescence, cliques may cross gender lines. Although cliques are generally stable over time, adolescents may move from one clique to another (Steinberg & Morris, 2001).

Female friendships may be more exclusive and stronger than those of males, whose friendships can still be intimate but harder to attain (Chu, 2005). Males, tending to socialize differently than do females, report less friendliness with other students (Ding & Hall, 2007). Although adolescents meet many peers in school, some have few friends and are more likely to experience loneliness and alienation (Buss, 2000). Regardless of gender, friendships involve using such prosocial behaviors as spoken-language engagement in conflict management.

The effect of peer-adolescent relations and parent-adolescent relations is bi-directional. For example, many middle adolescents examine their peers' decision-making behaviors on such social issues as curfew, attendance at parties, length of time on the telephone; they may then decide that these decisions fit within the realm of personal authority that involves the zone of privacy, thus a prelude to parent-adolescent conflict and negotiation (Daddis, 2008).

## ATYPICAL DEVELOPMENTAL PATTERNS OF ADOLESCENTS WITH HEARING LOSS

Adolescents with hearing loss are at heightened risk of medically and educationally diagnosed disorders (McClay, Booth, Parry, Johnson, & Roland, 2008). The incidence of children and adolescents with hearing loss who have additional disabilities varies from 20% to 42% (Gallaudet Research Institute, 2008; Hintermair, 2000; Powers, Elliott, Patterson, Shaw, & Taylor, 1995).

Neurobiological disorders affecting learning and language identified prior to adolescence, including cerebral palsy, cognitive or developmental delay, blindness, muscular dystrophy, and autism spectrum disorder, can commonly result in coexisting conditions. Sensorineural hearing loss is associated with a high incidence of inner ear abnormalities as determined by imaging such as magnetic resonance imaging (MRI) and positron emission tomography (PET); the greater the hearing loss, the more likely the presence of an inner-ear anatomical abnormality (McClay et al., 2008). Vestibular, motor, and visual dysfunctions are strongly associated with hearing loss of a syndromic nature and with poor speech and language growth rates (Rajput et al., 2003). For example, hearing, visual, and vestibular dysfunction are characteristics of Usher syndrome (Sun, van Alphen, Wagenaar, Huygen, Hoogenraad, Hasson, et al., 2001).

Additional disorders such as learning disabilities, emotional or behavioral disorders, developmental coordination disorder (a disorder that leads to poor coordination and clumsiness), central auditory processing disorder (CAPD), and attention-deficit hyperactive disorder (ADHD) also affect development (Tremblay, 2005). Learning disabilities include language difficulties typically referred to as “specific language impairment,” which may involve printed words. Language deficits associated with hearing loss can make it difficult to diagnose specific language impairment (Soukup & Feinstein, 2007). More recent findings support an association between hearing and language disorders in the adolescent population (Hawker et al., 2008). Some adolescents with hearing loss have difficulties with processing spoken language, phonological short-term memory, speech perception, or morpho-syntactical



acquisition. Some attend differently than do adolescents with hearing, displaying increased inattentiveness and behavioral impulsivity (Parasnis, Samar, & Berent, 2003).

Sensory processing disorders, reflecting a range of soft or non-specific neurological disorders, mean the processing of sensory information is atypical. Just as sensory processing disorders can accompany medically diagnosed neurological, psychiatric, behavioral, and language disorders, they can also be associated with hearing loss. For example, one study showed that 78% of children and youth with varying degrees of hearing loss were diagnosed by occupational therapists as having sensory processing dysfunction, and 50% were diagnosed by speech-language therapists as having oral-motor dysfunction (Rhoades, 2001a). Another study, in which parents of children with hearing loss completed a widely used checklist for sensory disorders, found that 70% of the children demonstrated sensory dysfunction (Bharadwaj, Daniel, & Matzke, 2009). Sensory processing disorders tend to be described somewhat vaguely, although their identification may assist in the process of intervention.

### Vestibular Function of Adolescents with Hearing Loss

Vestibular dysfunction is one of several possible causes of sensory processing disorder (Spetie & Arnold, 2007). The vestibular system permits stabilization in positioning the eyes, head, and body in space as well as maintaining postural stance stability. Balance is a complex multi-systemic process depending on at least three sensory systems: vision, vestibular function, and proprioception. The central nervous system modulates and integrates inputs from all sensory systems. Maturation of these sensory systems, including coordination of motor output, is also responsible for postural skills, which change throughout adolescence (Royal College of Physicians, 2007; Suarez, Angeli, Suarez, Rosales, Carrera, & Alonso, 2007). Adolescents with severe-profound sensorineural hearing loss frequently have associated malformation of the membranous labyrinth linked to balance