

Chapter 1 : How Noise Pollution Affects Kids | UPMC HealthBeat

Noise-induced hearing loss among children is a serious public concern and impacts on speech, language, cognitive, social and emotional development. The National Hearing Conservation Association reported that in a survey of children, ages six to 14, the average noise level during the day was 90 decibels, about the level of city traffic.

Parents must analyze their own home and recreational activities and make every effort to include quiet times with their children, reading, talking around the dinner table, and listening to their children. As early as , David Lipscomb studied 1, sixth, ninth, and twelfth graders and found that 3. A follow-up study by David Lipscomb in studied the hearing of college freshmen and found that Furthermore, their teachers reported that these students exhibited learning and behavior problems in the class. Parenting Noise-induced hearing loss among children is a serious public concern and impacts on speech, language, cognitive, social and emotional development. The National Hearing Conservation Association reported that in a survey of children, ages six to 14, the average noise level during the day was 90 decibels, about the level of city traffic. On the playground, these levels reached decibels, similar to that of a noisy subway or rock music. They must listen to toys before purchasing them, encourage children to lower the volume on stereos and noisy computer games, avoid or limit exposure at noisy movies and video arcades, and keep the volume down on personal stereo systems with headphones. If your child is in a school band, discuss the volume with the music teacher and encourage your child to wear hearing protection. Remember, that noise-induced hearing loss, though permanent, is preventable. Health experts agree that continuous exposure to noise over 85 decibels about the loudness level of city traffic , over time, will eventually harm hearing. Certain rattles, squeaky toys, toy telephones, and musical toys measure over decibels comparable to power tools. Children play with these toys close to their ears and manufacturers do not warn parents that sounds emitted from toys may be damaging to hearing. Noise levels at video arcades can exceed decibels the level of factory machinery. Computer games and stereo systems: Children should be cautioned to keep the volume down. Some systems are as high as decibels the level of a jackhammer. Mp3 players and smartphoens have been known to produce sound levels as loud as “â€” decibels. Children who listen to music this loud, for several hours a day, face an inevitable hearing loss. Action movies have the volume turned up well beyond 90 decibels, exposing young ears to exceedingly loud sounds. Parents should ask movie distributors and theater owners to lower the decibel level. Encourage Remember that quiet times foster an environment where parents and children can spend time together reading, talking and listening to each other. The Center for Hearing and Communication recommends: Reading to young children helps develop their reading skills and serves to forge closer relationships between parents and children. Children of all ages should be encouraged to read. Low-volume, educational computer games, puzzles, construction sets, and card games allow children to learn while playing in quiet, creative settings. Family oriented films that focus on warm interpersonal relationships are a nice way to spend time with your children. Visits to libraries and museums. Quiet outings spent together with family and friends can be a fun way to enjoy the family. If you have to shout to be heard three feet away, then the noise is too loud and is damaging your hearing. Turn down the volume or wear hearing protection.

Chapter 2 : Does noise affect learning? A short review on noise effects on cognitive performance in children

A critical review of the nonauditory effects of noise on American school children (Evans and Lepore,), including the deficits in learning, reading, and problem-solving, clearly demonstrates that more attention must be given to the effects of noise on cognitive development.

July 24, Since nearly the beginning of human history, music has been used as a force for healing. In modern times, scholars and doctors have researched the mysterious power of music. Some of this research has yielded truly incredible insights. Doctors have found that babies express preference for the same kind of music they heard while in the womb. Many studies have shown that exposing infants and babies in the womb to music helps build neural bridges used to process thought and information. Other studies indicate that early music exposure and instruction have benefits on the development of perceptual skills, which affects language and literary abilities; spatial reasoning, which is related to skills used to do math; and fine motor coordination. Unlike language, music activates every subsystem of the brain, including the structures involved in motivation and emotion. Modern music therapy developed in the aftermath of World Wars I and II, with musicians traveling to hospitals to play music for soldiers suffering from emotional and physical trauma. Today, it involves the clinical use of music interventions such as singing, playing, listening, and moving to music to address individual areas of need. Provide instruments such as egg shakers, maracas, and bells. Help young children move their bodies when listening to music. Have your child take turns with a partner playing and imitating patterns on an instrument. Each child gets a turn being the leader and leads the rest of the group in playing together with a certain speed, volume, or rhythm. Perhaps the most important aspect of using music to enhance development is that it provides children with sustained, focused attention from adults. Parents should not leave their child playing alone with music in the background and assume that this will automatically stimulate development. Research has shown that the effects of these experiences can last a lifetime. What is your favorite song to sing or listen to with your child? The Science of Music, the Purpose of Music. Improving the Lives of Children with Special Needs. Music Therapy Matters, n. Parlakian, Rebecca, and Claire Lerner. Using Music with Infants and Toddlers.

Chapter 3 : The impact of noise on a healthy, happy childhood | CHC

However, noise can become harmful when it interferes with a child's normal activities, such as sleeping or talking, or disrupts or diminishes a child's health or quality of life.

Printer Friendly Children and Music: Benefits of Music in Child Development Singing and music play an important role in our culture. At home, music can become part of our family culture – a natural part of our everyday experiences. From birth, parents instinctively use music to calm and soothe children, to express their love and joy, and to engage and interact. Parents can build on these natural instincts by learning how music can impact child development, improve social skills, and benefit kids of all ages. Music and the Brain: Music ignites all areas of child development and skills for school readiness: It helps the body and the mind work together. Exposing children to music during early development helps them learn the sounds and meanings of words. Dancing to music helps children build motor skills while allowing them to practice self-expression. For children and adults, music helps strengthen memory skills. In addition to the developmental benefits of music, why is music important? Simply put, it provides us with joy. Just think about listening to a good song on the car radio with the window down on a beautiful day. Playing music for infants proves that, even at an early age, children sway, bounce, or move their hands in response to music they hear. Many preschoolers make up songs and, with no self-consciousness, sing to themselves as they play. Children in elementary school learn to sing together as a group and possibly learn to play a musical instrument. Older children dance to the music of their favorite bands and use music to form friendships and share feelings. Try these activities and games with your children to experience the pleasure and learning that music brings. Infants recognize the melody of a song long before they understand the words. They often try to mimic sounds and start moving to the music as soon as they are physically able. Quiet, background music can be soothing for infants, especially at sleep time. Loud background music may overstimulate an infant by raising the noise level of the room. Sing simple, short songs to infants in a high, soft voice. Try making up one or two lines about bathing, dressing, or eating to sing to them while you do these activities. Find musical learning activities for infants. Toddlers love to dance and move to music. The key to toddler music is the repetition of songs, which encourages the use of words and memorization. Silly songs make them laugh. Let them reproduce rhythms by clapping or tapping objects. Preschoolers enjoy singing just to be singing. They like songs that repeat words and melodies, use rhythms with a definite beat, and ask them to do things. Preschool children enjoy nursery rhymes and songs about familiar things like toys, animals, play activities, and people. They also like finger plays and nonsense rhymes with or without musical accompaniment. School-Age Children and Music. School-age children begin expressing their likes and dislikes of different types of music. They may express an interest in music education, such as music lessons for kids. Teenagers may use musical experiences to form friendships and to set themselves apart from parents and younger kids. They often want to hang out and listen to music after school with a group of friends. Remember those days of basement and garage bands? They often have a strong interest in taking music lessons or playing in a band. There is no downside to bringing children and music together through fun activities. From the pure pleasure of listening to soothing sounds and rhythmic harmonies, to gaining new language and social skills, whatever the setting – a quiet room at home with family, a large grassy field filled with people, or a busy classroom – music can enliven and enrich the lives of children and the people who care for them. More on This Topic: Here are some music suggestions that are appropriate for both kids and adults.

Chapter 4 : Effects of Noise Children

Children and noise 3 To understand, recognize and know 1. Definition and characteristics of sound and noise 2. Sources and settings of noise exposure 3. Adverse effects of noise exposure.

Received May 14; Accepted Aug The use, distribution or reproduction in other forums is permitted, provided the original author s or licensor are credited and that the original publication in this journal is cited, in accordance with accepted academic practice. No use, distribution or reproduction is permitted which does not comply with these terms. This article has been cited by other articles in PMC. Experimental studies addressing the impact of acute exposure showed negative effects on speech perception and listening comprehension. These effects are more pronounced in children as compared to adults. Children with language or attention disorders and second-language learners are still more impaired than age-matched controls. Noise-induced disruption was also found for non-auditory tasks, i. The impact of chronic exposure to noise was examined in quasi-experimental studies. Indoor noise and reverberation in classroom settings were found to be associated with poorer performance of the children in verbal tasks. Regarding chronic exposure to aircraft noise, studies consistently found that high exposure is associated with lower reading performance. Most of these studies were conducted with adults. The present review, however, will focus on studies including children. Children are especially vulnerable to harmful effects of environmental noise, as cognitive functions are less automatized and thus more prone to disruption. The ability to recognize speech under conditions of noise or noise combined with reverberation improves until the teenage years Johnson, ; Wightman and Kistler, ; Talarico et al. With stationary noise makers, signal-to-noise ratios SNRs have to be 5â€”7 dB higher for young children when compared to adults in order to achieve comparable levels of identification of speech or nonspeech signals, with adult-like performance reached at about 6 years of age Schneider et al. However, with maskers that vary over time, i. Furthermore, children are less able than adults to make use of spectro-temporal and spatial cues for separation of signal and noise Wightman et al. These findings demonstrate that children are especially prone to informational masking, i. Therefore the probability of successfully matching incomplete speech input with stored long-term representations is reduced Nittrouer, ; Metsala, ; Mayo et al. In addition, young children are less able than older children and adults to make use of contextual cues to reconstruct noise-masked words presented in sentential context Elliott, Behavioral and ERP measures from dichotic listening paradigms provide evidence that auditory selective attention improves throughout entire childhood Doyle, ; Pearson and Lane, ; Coch et al. Owing to the mediating role of linguistic competence and selective attention, children with language or attention disorders are still more impaired than normally developing children by noise in speech perception tasks Geffner et al. A stronger noise effect is also evident for children tested in their second language when compared to native children Crandell and Smaldino, Studies with adults revealed that even skilled non-native listeners, whose performance in quiet is comparable to that of native listeners, are outperformed by native listeners under conditions of noise or noise combined with reverberation Rogers et al. Studies reviewed so far focused on simple tasks requiring identification of isolated speech targets in noise. However, listening in everyday situations, e. Effective listening in these situations requires semantic and syntactic processing of complex oral information while developing a coherent mental model of the story meaning Kintsch, Thus, the question arises how noise affects performance in complex listening tasks. Only a few studies in this field included children. Adults were less affected. The noise effects found in these studies could not be attributed to impaired identification. A possible explanation is that identification of degraded speech requires extra resources which are then unavailable for encoding, storage, and processing of the information McCoy et al. In addition, age-related improvements in attentional control e. Children are less able than adults to ignore irrelevant sounds, and thus are more susceptible to sound-induced disruption in both auditory and non-auditory tasks. We will return to this point in the following section. This has practical implications for the acoustical design of classrooms, since effective listening is a linchpin of school learning. The issue of classroom acoustics has thus gained much interest during the past decades. But even though international and national standards concerning ambient noise levels and reverberation in classrooms were

developed in the past decades, many classrooms still do not fit the needs of young listeners Bradley and Sato, ; Klatte et al. Immediate serial recall of visually presented verbal items is reliably impaired by task-irrelevant sounds for reviews see Hughes and Jones, ; Beaman, ; Schlittmeier et al. Impairments occur with single talker speech and non-speech sounds such as tones or instrumental music, but not with continuous broadband noise or babble noise. This so-called irrelevant sound effect ISE occurs reliably even with low-intensity sounds, with meaningless speech e. However, the ISE magnitude is determined by inherent properties of the irrelevant sound. Recall performance is specifically impaired by sounds with a changing-state characteristic, i. For example, irrelevant sounds consisting of different syllables or tones evoke an ISE, whereas steady state sounds, e. Different theories have been proposed concerning the underlying mechanisms of ISE evocation. Some of these assume that irrelevant sounds have automatic access to working memory, causing specific interference with the retention of cues to serial order Jones et al. Other accounts attribute the ISE to the attentional burden caused by the necessity to ignore the sounds Elliott, Elliott reported a dramatic increase in the magnitude of the ISE on serial recall of visually presented digits with decreasing age. The age effect was interpreted as evidence for a dominant role of attentional control in ISE evocation. In a recent study of this group Elliott and Briganti, , the age effect was replicatedâ€”albeit smaller in magnitudeâ€”but other experiments in the series yielded convincing evidence against the attentional account of the ISE. These and other findings Hughes et al. On the one hand, irrelevant sounds with a changing state characteristic automatically interfere with maintenance of item or order information in short-term memory. This mechanism is the dominant source of disruption in the standard ISE paradigm, and seems to be adult-like in first-graders. On the other hand, irrelevant sounds may capture attention. The impact of attention capture depends on characteristics of the sound, and on the attentional abilities of the participants. Auditory events that are salient e. Children are more susceptible to sound-induced distraction due to limited attentional control. Accordingly, in Klatte et al. Early studies in this field provided little support for noise-induced impairments Kassinove, ; Johansson, More recent results are inconsistent. Dockrell and Shield analyzed effects of babble and babble mixed with traffic sounds on third-graders performance in tests assessing reading, spelling, arithmetic, and attention. For all tests, overall scores were lower with babble noise when compared to quiet. Contrary to prediction, however, reading and spelling was even better in the babble plus traffic noise condition when compared to quiet and babble, and error rates in the attention test were higher in quiet when compared to both noise conditions. These results are difficult to interpret as children were not randomly assigned to noise conditions and instead were tested in their original class settings. As only two classes were assigned to each noise condition and class membership is known to affect academic performance e. A number of studies investigated the effects of background speech and transportation noise on delayed memory for texts in teenagers. Participants read prose paragraphs under different noise conditions and were later tested for prose memory in silence. Recall performance was impaired by meaningful speech Hygge et al. Concerning transportation noise, results are inconsistent. Hygge found impairments due to aircraft noise during encoding. Thus, all except one of the studies found impairments due to meaningful speech. This is in line with studies with adults, showing that meaningful speech evokes stronger impairments than meaningless speech in school-related verbal tasks involving reading Jones et al. According to the interference-by-process-account Marsh et al. As transportation noise does not evoke such processes, its effect on reading found in some, but not all studies, is presumably due to a more general attention-capture process. Note, however, that category membership e. As outlined earlier, the potential of a sound to capture attention depends on characteristics such as salience, predictability, and deviance from the recent auditory context. Thus, in addition to its specific effects on semantic processing and serial recall, speech noise containing such features is able to act as distractor Hughes et al. On the other hand, transportation noise lacking such features has no effect on performance Klatte et al. Research in this field focused on indoor noise at school and aircraft noise. However, some of these studies are difficult to interpret due to methodological limitations. Thus, testing was done in noisy conditions for the exposed and in quiet conditions for the non-exposed children, resulting in confound of acute and chronic exposure e. Thus, insufficient control of SES variables in early studies may have lead to an overestimation of the noise effect Haines et al. With SES being controlled, the authors found no effect of

aircraft noise exposure on sustained attention, working memory, and delayed recall of orally presented stories, but a linear exposureâ€™effect relationship between aircraft noise and decreasing reading comprehension. This effect is often cited as evidence for a causal role of aircraft noise in reading impairment. What is often unreported in the secondary literature is, however, that there was another exposureâ€™effect relationship, revealing enhanced performance in episodic memory with increasing exposure to road traffic noise. This counter-intuitive finding remains unexplained. Concerning the underlying mechanisms of chronic noise effects, some authors proposed that enduring exposure to noise in early childhood affects the development of basic language functions which are of special importance in reading acquisition Evans and Maxwell, ; Maxwell and Evans, ; Klatt et al. In line with this argument, electrophysiological studies revealed alterations in the cortical responses to speech sounds in individuals with a long-term exposure to occupational noise Brattico et al. Children are much more impaired than adults by noise in tasks involving speech perception and listening comprehension. Non-auditory tasks such as short-term memory, reading and writing are also impaired by noise. Even though the reported effects are usually small in magnitude, they have to be taken seriously in view of possible long-term effects and the accumulation of risk factors in noise-exposed children Evans, Obviously, the findings reported in this review have practical implications for the acoustical design of schools, for the placement of schools in the vicinity of airports, and for the policy of noise abatement. Conflict of interest statement The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest. The phonological loop as a language learning device. Auditory distraction from low-intensity noise: Age-related differences in irrelevant-speech effects. Aging 23, â€™ Traffic noise and executive functioning in urban primary school children:

Chapter 5 : Children and Music: Benefits of Music in Child Development | Bright Horizons®

Chronic effects of noise on children's cognitive development. In view of the harmful effects of acute noise, the question arises whether enduring exposure to environmental noise may cause persisting deficits in children's cognitive development.

Evans Cornell University There is a considerable amount of research documenting the effects of noise on children. The effects are largely negative. In this presentation I will briefly describe the findings of research in this field, discuss current research by Maxwell and Evans, and finally outline design issues related to noise and child care centers. While the possibility of hearing damage is, and should be, of concern to parents and educators, the nonauditory effects of noise on children also deserves attention. The literature on the latter topic falls into three categories; physiological effects, motivational effects, and cognitive effects. Physiological effects Elevated blood pressure levels in school-aged children is associated with living or going to school near a major noise source e. Although the blood pressure levels of children exposed to these major noise sources are within the normal range, they are higher than for children not exposed to major noise sources. These elevated blood pressure levels are of concern for two reasons. One, the levels do not habituate with continued exposure, and two, elevated pressure levels in children appear to continue this pattern into adulthood thereby increasing the risk for cardiovascular disease. The decibel levels in these studies ranged from 95 to dBA peak. In each case the noise exposure was chronic. Motivational effects Research findings suggest that exposure to uncontrollable noise may make children more vulnerable to learned helplessness. Most of this research has been with school-aged children, including kindergartners. One study found that children attending a school near a major airport were less likely to solve a challenging puzzle and to persist at it as well. Another study found that children exposed to noise were more likely to abdicate their choice for a reward to their teachers. The children decided to let the adult pick a prize for them rather than exercise their option to do so. Teachers in noisy schools also report greater difficulty in motivating children in their school work. Children often had less tolerance for frustration. Limited work has been done with younger children. One study in a residential setting found that 12 month-old infants in noisy homes exhibited less mastery-oriented play behavior with their toys than their counterparts in quieter homes. The peak noise readings in the studies described above was 95 dBA. Cognitive effects Most of the research on the nonauditory effects of noise on children has been on cognitive effects. The research on memory and noise for children parallels that of adults; there appears to be little or no effects of noise on simple memory. This holds true for both chronic and acute exposure to noise. However, if the memory task requires special attention there does appear to be some negative effects of noise. In other words, if the individual has to pay particular attention because of the difficulty of the task, noise may interfere with the memory task. Noise levels in these studies were in the range of 22 - 78dBA. The research on attention suggests that children exposed to chronic noise may suffer deficits in this area. Children exposed to chronic noise seem to develop cognitive strategies for coping with the distracting effect of noise. Young children 5 years old from noisy residential environments seem to be better able to tune out distracting auditory stimuli when asked to perform a discrimination task in a noisy environment than children from quieter homes. Four year old children from noisy day care centers performed better under noisy conditions than children from quiet day care centers. These young children seem to be resistant to the distracting effects of noise because they tune out the noise. However, additional research suggests that as children get older school-aged this advantage disappears. In these studies older children from quieter environments were better at discrimination tasks done under noisy conditions. These children were able to screen out the noise and concentrate on important cues. Children from noisy environments learned to tune out auditory stimuli but in a nondiscriminatory way and tuned out important cues. Background noise, in particular irrelevant speech, interferes with children understanding the spoken word. Several studies have documented a link between noise and academic achievement, in particular reading. There is also evidence to suggest that children from noisy homes and in noisy schools are at more of a disadvantage than children from quieter homes. Children with learning disabilities may also be more susceptible to the negative effects of chronic noise exposure. The noise

source was a nearby airport; planes flew over the school on an average of every 6 minutes resulting in classroom decibel levels of 70-80 dB. In this study children in the noisy school had poorer reading skills than children from the quiet school. The noisy school children also were not good at distinguishing speech masked by white noise but were able to distinguish specific sounds. This finding suggests that there is selective screening out of auditory stimuli by children in chronic noise settings. Another possibility is that speech is used differently in noisy settings than in quiet settings and children miss learning certain language skills. Nevertheless language skills related to speech seem also to be related to reading skills. All children were tested in quiet conditions in this study thereby confirming that chronic noise, and not acute noise, is related to academic achievement. The current study looked at 4 year old children attending a day care center. In this study the noise source was the classroom itself due to the design of the center and classrooms. Ceilings were very high and no sound absorbent materials were used. Some classroom walls were not floor to ceiling thereby allowing noise from adjacent spaces to drift in. Teachers and administrators had identified the noise as excessive and had made arrangements to reduce the noise. Children were tested in as quiet conditions as possible before and after the noise abatement sound absorbent panels installed in the ceiling. Several measures of pre-reading language skills were used. Teachers also rated children on their language skills. The before and after decibel levels in the classrooms were:

Chapter 6 : The Effects of Music on Childhood Development | Penfield Children's Center

A growing body of research in the United States and Western Europe documents significant effects of the physical environment (toxins, pollutants, noise, crowding, chaos, housing, school and neighborhood quality) on children and adolescents' cognitive and socioemotional development. Much less is.

Developmental milestones are things most children can do by a certain age. Children reach milestones in how they play, learn, speak, behave, and move like crawling, walking, or jumping. In the first year, babies learn to focus their vision, reach out, explore, and learn about the things that are around them. Cognitive, or brain development means the learning process of memory, language, thinking, and reasoning. Listening, understanding, and knowing the names of people and things are all a part of language development. During this stage, babies also are developing bonds of love and trust with their parents and others as part of social and emotional development. The way parents cuddle, hold, and play with their baby will set the basis for how they will interact with them and others. Positive Parenting Tips Following are some things you, as a parent, can do to help your baby during this time: Talk to your baby. She will find your voice calming. Answer when your baby makes sounds by repeating the sounds and adding words. This will help him learn to use language. Read to your baby. This will help her develop and understand language and sounds. Sing to your baby and play music. This will help your baby develop a love for music and will help his brain development. Praise your baby and give her lots of loving attention. Spend time cuddling and holding your baby. This will help him feel cared for and secure. Watch your baby closely for signs of being tired or fussy so that she can take a break from playing. Take care of yourself physically, mentally, and emotionally. Parenting can be hard work! It is easier to enjoy your new baby and be a positive, loving parent when you are feeling good yourself. Look around your home for things that could be dangerous to your baby. As a parent, it is your job to ensure that you create a safe home for your baby. It also is important that you take the necessary steps to make sure that you are mentally and emotionally ready for your new baby. Here are a few tips to keep your baby safe: Babies have very weak neck muscles that are not yet able to support their heads. If you shake your baby, you can damage his brain or even cause his death. Make sure you always put your baby to sleep on her back to prevent sudden infant death syndrome commonly known as SIDS. Read more about new recommendations for safe sleep for infants here. Protect your baby and family from secondhand smoke. Do not allow anyone to smoke in your home. Place your baby in a rear-facing car seat in the back seat while he is riding in a car. Prevent your baby from choking by cutting her food into small bites. Never carry hot liquids or foods near your baby or while holding him. Because children can get serious diseases, it is important that your child get the right shots at the right time. Between 6 and 12 months of age, your baby will learn about new tastes and textures with healthy solid food, but breast milk should still be an important source of nutrition. Breastfeeding is the natural way to feed your baby, but it can be challenging. If you need help, you can call the National Breastfeeding Helpline at or get help on-line at <http://www.nationalbreastfeedinghelpline.org>. You can also call your local WIC Program to see if you qualify for breastfeeding support by health professionals as well as peer counselors. Or go to <http://www.wic.gov>. Keep your baby active. Getting down on the floor to move helps your baby become strong, learn, and explore. Try not to keep your baby in swings, strollers, bouncer seats, and exercise saucers for too long. Limit screen time to a minimum.

Chapter 7 : Beware: noise is hazardous to our children's development | CHC

Even children with mild or minimal hearing loss can benefit from hearing aids, because the amplified sound produces stimulation and supports growth of the auditory centers of the brain. These brain structures are best developed and become most interconnected when a child is very young.

As a result of studies conducted around the world in recent decades, the knowledge and understanding of these effects have increased significantly. Reducing these effects is a priority of regional policies on health and the environment in the WHO European Region and is necessary for the achievement of the Millennium Development Goals on a global scale. The review of accumulated evidence, published by WHO in , considers the effects of air pollution in a number of areas. It considers the effects on the health and development of children during the prenatal period, on the development of the respiratory system and lung function as well as respiratory morbidity , and on the incidence of childhood cancer. It also summarizes current knowledge about the links between air pollution and neurodevelopmental and behavioural effects. The experts involved in preparing the report identified a hierarchy of health outcomes for which evidence: Findings Various periods of vulnerability characterize children. The intrauterine, perinatal and early childhood periods, during which the lungs are developing and maturing, are very vulnerable times. These are periods when the lungs are susceptible to injury by air pollutants. Exposure during these periods reduces the maximal functional capacity achieved in adult life and can lead to enhanced susceptibility during adulthood to infection and to the effects of such pollutants as tobacco smoke and those present in occupational exposures. Children with underlying chronic lung diseases, particularly asthma and cystic fibrosis, are especially vulnerable. These children are at greater risk of adverse effects from pollution than are healthy children. Also, children subject to higher exposures indoors – for example, from tobacco smoke or smoke from poorly maintained heating or cooking appliances – are at greater risk of being affected by outdoor pollutants. Effects for which evidence is sufficient to infer a causal relationship with exposure to air pollution There is now substantial evidence on the adverse effects of air pollution on different pregnancy outcomes and infant health. The evidence shows that air pollution, with concentrations typical of many European cities, increases the risk of death from respiratory causes in the postneonatal period. The evidence also shows a relationship between exposure to ambient air pollutants and adverse effects on the development of lung function. Reversible lung function deficits, chronically reduced lung growth rates and lower lung function levels are associated with exposure to air pollution. Moreover, the evidence shows clearer relationships for particulate matter and traffic-related air pollution indicated by nitrogen dioxide than for other pollutants. The report concludes that there is a causal relationship between exposure to air pollutants and aggravation of asthma. The evidence is also sufficient to assume a causal link between exposure to particulate matter and increased prevalence and incidence of cough and bronchitis. In particular, such environmental contaminants as certain heavy metals and persistent organic pollutants show significant adverse effects on the development of the nervous system and behaviour in children. Also, there is sufficient evidence of a causal relationship between exposure to lead and neurobehavioral deficits in children, in terms of cognitive impairment. Effects for which evidence is suggestive of causality Studies on birth weight, preterm births and intrauterine growth retardation also suggest a link with air pollution, but these studies are still not sufficient to draw firm conclusions about the causality of the observed associations. Although the report found little evidence for a causal link between the prevalence and incidence of asthma and air pollution in general, recent studies suggest that pollutants can enhance allergic sensitization in those genetically at risk, lending plausibility to the role of potentially injurious effects of ambient air pollutants in the causation of paediatric lung disease, including asthma. The mechanisms suggested for these effects need further research. A significant body of evidence supports the view that much of the morbidity and mortality related to air pollution in children occurs via interactions with respiratory infections, which are very common among children. Evidence also suggests a causal relationship between exposure to ambient air pollution and increased incidence of upper and lower respiratory symptoms – many of them also being indicative of infections. There is also evidence that suggests a causal link between adverse

health effects and exposure to mercury, polychlorinated biphenyls and dioxins at current exposure levels. As of yet, however, relatively few studies have looked at the effects of reduced air pollution. Nevertheless, existing studies show that reduced exposure to air pollutants can lead to a decrease in hospital admissions for respiratory complaints, a lower prevalence of bronchitis and respiratory infections, and improvement in lung function growth rates. Effects for which evidence is not sufficient or shows no association between outcomes and exposure Accumulated epidemiological evidence is insufficient to infer a causal link between childhood cancer and the levels of outdoor air pollution typically found in Europe. However, the number of studies available is limited, and their results are only partially consistent. A decrease in motor vehicle exhausts will substantially benefit the respiratory health of children. Type of evidence This report is based on epidemiological and toxicological literature, published mainly during the last decade. Experts prepared synthesis papers, and these were reviewed externally and discussed according to a consensus assessment of the strength of the evidence on the links between various health outcomes and air pollution.

Chapter 8 : WHO/Europe | What are the effects of air pollution on children's health and development?

Minimize background noise and distractions - this is important for infants and very young children, especially those who are having difficulty with communication development. This could mean: This could mean.

Contact Kids and Noise Federal guidelines regulate the amount of allowable noise in the workplace, but did you know there are no similar regulations for allowable noise in daily recreational activities? The world has become a noisier place, and this noise poses a threat to everyone, including children. Remember, we use the word noise to refer to any potentially hazardous sound! In fact, noise exposure is one of the most common causes of hearing loss in adults. Such noise includes occupational noise in the work place, firearms use and noise in other recreational activities. Studies have indicated that more and more children are experiencing hearing loss at all ages: If you are interested in this program, please contact ACA! Check out this Adopt a Band link. Importantly, these students were also identified by their teachers as exhibiting learning and behavior problems in class. Where does this noise come from? A very important consideration is that most adults think of noises as being at a distance, whereas a child will often hold a toy very close to the ear. The closer the ear is to the sound source, the more hazardous it can be! For comparison to the following, please remember that federal guidelines require that hearing protection be worn in the workplace if noise levels are above 85 dBA! Rattles and squeak toys can create noises as high as dBA. Musical toys like guitars, drums and horns can emit even louder sounds, up to dBA. Toy phones can ring at levels as high as dBA. Toys that amplify the voice can produce sounds up to dB. Firearms can create explosive sounds as loud as dBA. Older children and teens have even more opportunities for exposure to hazardous noise levels. Various activities that older children and teens enjoy have been shown to be potentially hazardous to hearing. Just one hour per day of loud music from a personal stereo dBA can cause permanent hearing loss! Teenagers who do yardwork for extra spending money" or who do yardwork as part of their regular chores" may also be exposed to hazardous noise levels. Participation in musical activities" the school band or a garage rock band" can also provide opportunities for excessive noise levels to damage hearing. Why are children so resistant to hearing protection? As in so many areas of safety, children often think they are invincible. What can parents do? Parents can set a good example! If good hearing and the use of hearing protection are important to you, it will be important to your child as well. By wearing hearing protection when exposed to hazardous noise, parents send a clear message to their children: Monitor the sound levels in these activities and, if you think they are too loud, take action! Require your children to reduce the loudness of personal stereos, video games, computer games and other noise producers, and set consequences if they fail to do so. Discuss noise levels with activity directors. Finally, require your children to use hearing protection. Check out this link for further information regarding hearing protectors. Parents can take a pro-active stance. If your child is involved in musical activities, uses a personal stereo regularly, is a hunter or uses other types of firearms, or is involved in any other noisy activity such as lawn care , obtain a baseline hearing evaluation and counseling from an audiologist regarding the risk that noise poses to hearing and means of preventing noise-induced hearing loss. Parents can recognize the warning signs of noise-induced hearing loss. Noise-induced hearing loss is preventable. Chronic Noise The noise described above which damages hearing can be called acute noise, because it is typically of relatively short duration. Chronic noise, on the other hand, typically occurs at much lower levels and does not damage hearing. Researchers studied children in schools near an airport and an elevated train track and compared them to similar children in quiet schools. Other factors were reported as possibly affecting learning in noisy schools, such as teacher irritability. However, after noise reduction efforts were implemented for the school near the elevated train tracks, the reading scores for that school improved to match those in the quiet school! Children who are exposed to chronic noise often have less tolerance for frustration, reduced ability to attend to tasks at hand, and reduced motivation to help others. Additionally, the children who lived around chronic noise reported more sleep difficulties and were more likely to report feeling unwell than children in quiet neighborhoods. Parents can offer children opportunities for peace and quiet. Turn off the TV, run the dishwasher when children are at school and encourage quiet activities. Read to children

and encourage them to read. Plan quiet outings to places like libraries and museums. Choose family oriented films that focus on relationships, rather than violent, noisy action films. Parents can give noise the priority status it deserves. If your child is in chronic noise environments at school or play, get involved and work for changes!

Chapter 9 : Infants in a Noisy World: Does Noise Make It More Difficult to Learn to Talk?

Tallal tells WebMD that 10% to 20% of children have some problems discerning subtle acoustic differences between sounds, and these problems may manifest through delayed speech or learning development.

So, the earlier hearing loss is detected and treated, the better. The best hearing aids, tools and techniques and your acknowledging support together - create a better future for your child. The importance of sound Language is learned through exposure to sounds. Children pick up words they hear in their environment. Their listening skills also influence their ability to learn to both read and write and it greatly influences their social skills as well. To develop spoken language, children must be able to hear speech clearly and also to hear themselves. As your child grows, they face a range of challenges during different stages of their lives, from infancy through the school years and beyond. Their hearing loss will impact their life differently in the transition from being in the security of your home to being on their own in challenging environments such as school, sports and other social activities. We learn throughout our lives. From the moment we are born, we learn by observing and imitating our parents, family and friends. Later on, as we attend school, get a job and lead active lives, we continue the learning process. Children with hearing loss can live lives that are just as full and productive as other children. They just need additional support when learning. The first step to using hearing aids In order to develop full, rich, verbal language, children must be able to tune into the speech sounds around them. It is critical to be able to hear as much as possible during all waking hours. Just as you rely on light in order to move around confidently and fully understand and enjoy all of the activities going on around you, your child relies on their hearing aids to help them get the most from their surroundings to support their language development. Helps development of essential brain structures Even children with mild or minimal hearing loss can benefit from hearing aids, because the amplified sound produces stimulation and supports growth of the auditory centers of the brain. These brain structures are best developed and become most interconnected when a child is very young. Which is why it is important to get hearing aids as early as possible. It is the auditory centers of the brain that make sense of sound and so the brain structures must be stimulated to develop. The ears receive sounds and send them to the brain, where they are processed to give meaning. Clear communication Children with hearing loss must be close to the talker in order to detect and comfortably hear what is being said. You can support your child in everyday situations and help them better understand and develop speech by keeping a few basic rules in mind. When we communicate we use more than just spoken language. We use our hands, body language and facial expressions. A lot of effort is required for your child to keep up with people with normal hearing, so make sure to be very clear in your communication and keep the 3 basic rules below in mind. You can also share the communication tips with your child. Keep your face in view If your face is well lit, your child can easily see your facial expressions, and read your lips. So avoid leaning your face on your hand or looking down at a book or tablet while talking. Speak clearly Speak clearly and at normal pace, and remember that there is no need to shout. If your child has difficulty understanding you, try rephrasing the sentence rather than just repeating yourself. Avoid background noise When talking, try to avoid background noise. Turn off the television and close any open windows. Move closer to your child to make your voice louder, or try to find somewhere quieter to talk. Other communication techniques Often it is relevant to consult an auditory- verbal therapist, a listening and spoken language specialist, speech- language pathologist, or learn other communication techniques. Infant to toddler years If your child suffers from hearing loss, their ability to develop speech is dependent on the correct care from the very beginning. Learn about solutions and how to support your child.