

INSTITUT FÜR UMWELTHYGIENE DER UNIVERSITÄT WIEN

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**Literaturzusammenstellung
zum Thema
Auswirkungen von Fluglärm
auf den Menschen**

Erhebungszeitraum 1985 bis 1.Quartal 1999

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AUFTRAG UND VORWORT

Mit Schreiben vom 14.04.1999 wurde das Institut für Umwelthygiene der Universität Wien vom Magistrat der Stadt Wien, MA22, Umweltschutz beauftragt, eine

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zu erstellen.

Im Jahre 1988 hatten o.Univ.Prof. DDr. Manfred Haider (damals Leiter des Institutes für Umwelthygiene), Univ.Doz. Dr. M.Koller und AR H.-G.Stidl in Zusammenarbeit mit Frau Hon.Prof. Dr.Judith Lang, sowie mit Univ.Prof. Dr. J.R. Möse und Univ.Prof. Dr.K.Steinbach die "Qualitätskriterien Fluglärm" verfaßt, welche auf Basis des damaligen Kenntnisstandes eine Grundlage für die Erarbeitung eines Fluglärmgesetzes bilden sollten. Seit der Erstellung dieser Qualitätskriterien ist es allerdings bis heute zu keinem Gesetzesbeschluß gekommen, obwohl darin zwei Gesetzesentwürfe enthalten waren, welche sowohl die schallschutztechnischen als auch die lärmhygienischen Voraussetzungen behandelten. Die dort vorgeschlagenen Lärmschutzzonen, bzw. die darauf basierenden Nutzungsbeschränkungen wurden allerdings in der Praxis immer wieder bei der Behandlung von Fluglärm im Rahmen der Raumplanung und der Überprüfung der Auswirkungen bestehender Flughäfen und größerer Flugplätze auf deren Umgebung als Orientierungshilfe herangezogen.

In den letzten Jahren konnte festgestellt werden, daß die jährlich durchgeführten rechnerischen (und meßtechnisch abgesicherten) Überprüfungen der Belastungszonen um Flughäfen und größere Flugplätze ergaben, daß - trotz Zunahme der Flugbewegungszahlen - die Zonengrößen konstant blieben oder sogar abnahmen, was auf die zunehmende Umstellung auf Flugzeuge mit geringeren Schallemissionen zurückzuführen ist. Dem steht gegenüber, daß die Belästigungsreaktionen in der Umgebung dieser Flugplätze eher zunehmen und z.T. auch Gebiete umfassen, aus welchen früher keine Beschwerden über Fluglärm geäußert wurden. Es ergibt sich daraus die Notwendigkeit, die derzeit in Benützung befindlichen Beurteilungskriterien für Fluglärm auf ihre weitere Gültigkeit zu überprüfen und sie ggfs. auf Basis neuerer Erkenntnisse zu modifizieren. Einen ersten Schritt dazu stellt die vorliegende Arbeit dar, in welcher die seit Redaktionsschluß der "Qualitätskriterien Fluglärm" erschienene Literatur zum Thema Auswirkung von Fluglärm auf den Menschen in einer umfassenden Recherche erfaßt und dokumentiert wurde. In einem weiteren Projekt ist vorgesehen, auf Basis dieser Dokumentation, die wissenschaftliche Grundlagen zur Beurteilung der Auswirkungen von Fluglärmmissionen auf den Menschen zu überprüfen und ggfs. zu aktualisieren.

EINLEITUNG

In der hier vorgelegten Arbeit wird die seit 1985 erschienene Literatur zum Thema: "Gesundheitliche Auswirkungen von Flugverkehrslärm" zusammengetragen und nach Sachgebieten geordnet dargestellt, wobei sich die Auswahl der Literatur an der Gesundheitsdefinition der WHO orientiert, die Gesundheit als einen Zustand des umfassenden physischen, psychischen und sozialen Wohlbefindens und nicht nur des Fehlens von Krankheit oder Behinderung sieht. Die Zusammenstellung beschränkt sich auf die extraauralen also nicht gehörbezogenen Lärmwirkungen. Sie stellt die Vorarbeit für die in der Folge geplante systematische Aufarbeitung der Literatur dar. In dieser Fortführung des Projektes sollen die einzelnen Arbeiten auf ihre methodische Qualität sowie Vergleichbarkeit und inhaltliche Relevanz geprüft werden. Es ist weiters geplant, die vom gesundheitlichen Standpunkt wesentlichsten Gesichtspunkte für Überlegungen zu Regelungen im Bereich der Fluglärmbelastung aufzubereiten.

In der nun vorliegenden Literaturzusammenstellung wurden in erster Linie epidemiologische Untersuchungen und Feldstudien aufgenommen. Auf Laborstudien wird dort zurückgegriffen, wo Fragestellungen sich einer Untersuchung vor Ort aus methodischen oder theoretischen Gründen entziehen. In manchen Bereichen möglicher gesundheitlicher Auswirkungen von Flugverkehrslärm liegen noch wenige Untersuchungen vor (z.B. Wirkungen auf das Immunsystem). In solchen Fällen wurden zum Teil auch Arbeiten aufgenommen, in welchen die Auswirkungen anderer Lärmquellen untersucht wurden. Damit soll in diesen gesundheitsrelevanten Bereichen auf die zumindest theoretisch auch bei Fluglärm möglicherweise auftretenden und daher zu beachtenden Wirkungen hingewiesen werden. Eine Bewertung der Literatur wird in dieser Phase der Erhebungen nicht vorgenommen.

Zur Charakterisierung der Immissionen werden in den einzelnen Fluglärmstudien die unterschiedlichsten Maße verwendet, wodurch sowohl ein Vergleich der jeweiligen Belastungen an sich als auch die Zuordnung der beschriebenen Beanspruchungsphänomene erschwert wird. Eine diesbezügliche Analyse ist ein wesentlicher Schritt einer weiterführenden wertenden Bearbeitung. In der vorliegenden Literaturzusammenstellung werden die Begriffe "Lärmbelastung bzw. Lärmwirkung" zunächst in ihrer umgangssprachlichen Verwendung benützt, die keine klare Trennung zwischen den Begriffen Schall bzw. Geräusch als Beschreibung der physikalischen Eigenschaften der Immission und Lärm als wirkungsbezogenem Begriff macht.

Der folgenden Literaturzusammenstellung liegen Recherchen in verschiedenen Datenbanken zugrunde. So wurden medline, embase, topline und psycindex nach den interessierenden Themenbereichen durchsucht. Weiters wurden relevante europäische, vor allem deutschsprachige Zeitschriften, die nicht in diese Datenbanken aufgenommen sind, sowie Kongressbände der relevanten Internationalen Kongresse zum Thema Lärm/Lärmwirkungen bearbeitet. Die NASA Literaturdatenbanken sowie jene verschiedener internationaler Organisationen, die sich mit Fluglärm befassen wurden via Internet durchsucht und aufgearbeitet. Weiters wurde mit vielen der im Bereich der Fluglärmwirkungsforschung tätigen

Wissenschaftler persönlich Kontakt aufgenommen, um auch gegebenenfalls Literatur, die auf andere Weise nicht zu bekommen war, zu erhalten. Viele Publikationen liegen nur in Form von Reports vor. Diese wurden über die Autoren oder die herausgebenden Organisationen beschafft. Schließlich wurde Sekundärliteratur, auf welche erst im Zuge der Bearbeitung von Originalarbeiten, Reviews oder Bibliographien gestoßen wurde, erhoben und aufgenommen. Lagen von einem Autor mehrere gleichlautende Arbeiten über dieselbe Untersuchung vor, wurde jene mit der besten Verfügbarkeit in die Zusammenstellung aufgenommen.

Die Gliederung der Literaturzusammenstellung berücksichtigt in erster Linie die unterschiedlichen Bereiche möglicher gesundheitlicher Beeinflussung. Darüber hinaus wird aber die Literatur auch im Hinblick auf einige übergreifende Sonderfragestellungen zusammengefaßt wie z.B. Fluglärmwirkungen und Kinder, Fluglärmwirkungen im Streckenflugbereich (en route), Bedeutung der Lärmsensibilität im Hinblick auf Lärmwirkungen oder Untersuchungen zur dose/response Problematik (Dosis-Wirkungs-Beziehungen).

Im folgenden wird zu jedem Themenbereich ein kurzer Überblick über die in den einzelnen Arbeiten behandelten Themen gegeben. Daran anschließend folgt eine Liste der dem Themenbereich zugeordneten Literaturstellen in Kurzform. Nach der Behandlung der einzelnen Themenbereiche findet sich die Liteaturliste, welche alle Literaturstellen alphabetisch geordnet als vollständige Zitate - weitgehend mit Abstracts versehen - enthält.

LITERATURZUSAMMENSTELLUNG NACH THEMENBEREICHEN

Herz-Kreislaufsystem: Funktionelle Veränderungen / Erkrankungen

Funktionelle Veränderungen der cardiovasculären Aktivität als Reaktion auf Schallreize gehören ebenso zum gesicherten Wissen wie die Tatsache, daß verschiedene physikalische Schallcharakteristika vor allem aber emotionale sowie mentale Komponenten diese Effekte zusätzlich beeinflussen können. Ob und inwiefern langdauernde Belastung durch Fluglärm oder anderen Umweltlärm chronische Veränderungen der Herz-Kreislaufaktivität verursachen, die möglicherweise zu manifesten Erkrankungen führen, ist nach wie vor ungeklärt.

In den letzten Jahren sind zu diesem Thema einige interessante Feldstudien und Laborexperimente durchgeführt worden. Wegen ihrer Bedeutung wurden auch Berichte über eine Verkehrslärmstudie aufgenommen.

Untersucht wurde in diesen Arbeiten sehr unterschiedlich Aspekte wie z.B. systolischer und diastolischer Blutdruck, peripherer arterieller Gefäßwiderstand, Herzfrequenz, Herzfrequenz- und Atemarrhythmie sowie das Auftreten manifester Erkrankungen des HK Systems. In manchen Studien wurde durch Erhebungen des relevanten Medikamentverbrauches indirekt auf das Vorliegen von Erkrankungen geschlossen. Bei Bevölkerungsbefragungen wurde zum Teil auf subjektive Angaben zur Gesundheit zurückgegriffen.

Abel 1990

Alves 1999

American Academy of Pediatrics: Policy Statement 1997

Babisch 1985;

Babisch 1993b

Babisch 1993a

Babisch and Gallacher 1990

Babisch, Gallacher, Elwood, and Ising 1988

Babisch, Elwood, and Ising 1992)

Babisch 1998

Babisch, Elwood, and Ising 1993

Babisch, Gallacher, and Ising 1995

Berglund, Hassmen, and Job 1996

Berglund and Lindvall 1995

Branco, Aguas, Pereira, Monteiro, Fragata, Tavares, and Grande 1999

Branco, Rodriguez, Alves, and Jones 1999

Brenner, Oberacker, Kranig, and Buchwalsky 1993

Carter, Hunyor, and Ingham 1994

Cavatorta, Falzoi, Romanelli, Cigala, Ricco, Bruschi, Franchini, and Borghetti 1987

Cohen, Evans, Krantz, and Stokols 1980
Curio and Michalak 1993
de Jong 1993
Di Nisi, Muzet, Ehrhardt, and Libert 1990
Editorial 1992
Ellis, Ellis, and Mindell 1991
Elwood, Ising, and Babisch 1993
Evans, Bullinger, and Hygge 1998
Evans, Hygge, and Bullinger 1995
Fisher and Tucker 1991
HACAN and Holland 1997
Hartikainen, Sorri, Anttonen, Tuimala, and Laara 1994
Herbold, Hense, and Keil 1989
Ising and Rebentisch 1993a
Ising, Rebentisch, Babisch, Curio, and Sharp-Baumgartner 1990
Ising, Rebentisch, Poustka, and Curio 1990
Ising, Babisch, Günther, and Kruppa 1997
Knipschild 1997
Kryter 1994
Lercher and Kofler 1993
Lercher and Kofler 1995
Lukassonitz 1992
Marfeffe 1997
Maschke, Ising, and Arndt 1995
Maschke, Ising, and Hecht 1997a
Meecham and Shaw 1993
Melamed, Froom, Kristal-Boneh, and Gofer 1997
Michalak, Ising, and Rebentisch 1990
Morrell, Taylor, Carter, Job, and Peploe 1998
Morrell, Taylor, Carter, Job, and Peploe 1999
Morrell, Taylor, and Lyle 1997
Otten, Schulte, and von Eiff 1990
Öhrström, Björkman, and Rylander 1990
Parrot, Petiot, Loberau, and Smolik 1992
Passchier-Vermeer 1993
Pulles, Biesiot, and Stewart 1990a
Rosenberg 1991a
Schmeck 1992
Schwarze and Thompson 1999
Sgoutas Emch, Cacioppo, Uchino, Malarkey, Pearl, Kiecolt Glaser, and Glaser 1994
Spreng 1993

Staatsen, Franssen, and Lebret 1994
Stansfeld 1992
Stansfeld, Clark, Turpin, Jenkins, and Tarnopolsky 1985
Stansfeld and Shine 1993a
Stolbun, Karagodina, Soldatkina, Orlova, and Bobyleva 1989
Sutter 1991
Thomas and Williams 1986
Thompson 1993
Tomei, Papaleo, Baccolo, Tomao, Alfi, and Fantini 1996
Tucker and Hunt 1993
Vallet, Gagneux, Clairet, Laurens, and Letisserand 1988
Vallet, Pachiardi, Depitre, Tanguy, and Francois 1988
van Dijk 1990

Stoffwechselveränderungen und Veränderungen hämatologisch relevanter Faktoren: Effekte auf biochemische und korpuskuläre Blutkomponenten

Physische und psychische Belastungen führen zu Veränderungen verschiedener Stoffwechselprozesse (hormonelle Exkretion, Lipid- und Mineralstoffwechsel), der Glucosetoleranz sowie zu Änderungen in der korpuskulären Zusammensetzung des Blutes zum Zwecke einer Anpassung an die geänderten Umweltbedingungen. Ziel ist die Aufrechterhaltung der Homöostase.

Einige frühere Untersuchungen zur Wirkung von Fluglärm ließen chronische Effekte auf verschiedene Blutparameter als wahrscheinlich erscheinen. Während der letzten 15 Jahren wurden diesbezüglich nur wenige Untersuchungen bei Fluglärm durchgeführt. Da aufgrund der bisherigen Ergebnisse anzunehmen ist, daß die Effekte bei Straßenverkehrslärm und Fluglärm (solange man nicht Tieffluglärm isoliert betrachtet) weitgehend ähnlich sind, werden auch epidemiologische Untersuchungen zu Veränderungen von Blutparametern bei Straßenverkehrslärm aufgenommen sowie zu Vergleichszwecken einige Studien die neuere Ergebnisse bei Arbeitslärm erbrachten.

Untersuchungen zu Veränderungen der hormonellen Exkretion

Babisch 1993a

Babisch, Fromme, Beyer, and Ising 1996

Carter, Crawford, Kelly, and Hunyor 1993

Carter, Hunyor, Crawford, Kelly, and Smith 1994

Cavatorta, Falzoi, Romanelli, Cigala, Ricco, Bruschi, Franchini, and Borghetti 1987

Clarke, Wittwer, Abbott, and Schneider 1994

Curio and Michalak 1993

Editorial 1992

Esler, Jennings, Lambert, Meredith, Horne, and Eisenhofer 1990

Evans, Bullinger, and Hygge 1998

Evans, Hygge, and Bullinger 1995

Frustorfer, Pritsch, Ott, and Sturm 1988

Frustorfer, Pritsch, Pritsch, Clement, and Wesemann 1988

Gruber 1992

Hygge, Evans, and Bullinger 1993a

Irwin, Segal, Hauger, and Smith 1989

Ising, Babisch, Günther, and Kruppa 1997

Ising, Rebentisch, Babisch, Curio, and Sharp-Baumgartner 1990

Kay, Tarcic, Poltyrev, and Weinstock 1998

Lukassonitz 1992

Marth 1990

Marth, Gallasch, Fueger, and Mose 1988

Maschke 1992

Maschke, Arndt, Ising, Laude, Thierfelder, and Contzen 1995b

Maschke, Arndt, Ising, Laude, Thierfelder, and Contzen 1994

Maschke, Arndt, Ising, Laude, Thierfelder, and Contzen 1995a

Maschke, Breinl, Grimm, and Ising 1993

Maschke, Ising, and Arndt 1995

Maschke, Ising, and Hecht 1997a

Nikolic, Gec, Ivanovic, Micic, Sulovic, Nikolic, Sbutega Milosevic, Belojevic, and Neskovic 1991

Nomoto, Karasawa, and Uehara 1994

Passchier-Vermeer 1993

Raymond 1991

Sgoutas Emch, Cacioppo, Uchino, Malarkey, Pearl, Kiecolt Glaser, and Glaser 1994

Spehner, De-Wazieres, Nicod, HarragaS, Robert, and Seilles 1996

Tonnesen, Christensen, and Brinklov 1987

Untersuchungen zu Veränderungen des Lipid- und Mineralstoffwechsels, der Glucosetoleranz, der Plasma Viscosität und der Leukozytenzahl

Altena 1989

Babisch 1993b

Babisch 1993a

Babisch and Gallacher 1990

Curio and Michalak 1993

Editorial 1992

HACAN and Holland 1997

Idzior-Walus 1987

Ising and Rebentisch 1993a

Lercher and Kofler 1993

Lercher and Kofler 1995

Lukassonitz 1992

Marth 1990

Marth, Gallasch, Fueger, and Mose 1988

Melamed, Froom, Kristal-Boneh, and Gofer 1997

Passchier-Vermeer 1993

Schwarze and Thompson 1999

Thomas and Williams 1986

Störungen des Schlafes, insbesondere des Nachtschlafes

Befragungen an Fluglärm betroffenen zeigen in großer Regelmäßigkeit auf, daß die lärmbedingte Störung des Schlafes als eine der wesentlichsten Beeinträchtigungen betrachtet wird. Da es weiters als gesicherte Tatsache gilt, daß bei langfristig gestörtem Schlaf mit wesentlichen gesundheitlichen Auswirkungen zu rechnen ist, kann es nicht verwundern, daß zum Thema Fluglärm bzw. Umweltlärm ganz allgemein und Schlaf sehr viele Untersuchungen vorliegen. Unterschiede in den angewandten Untersuchungsmethoden, in den verwendeten Schallkenngrößen, in der Berücksichtigung intervenierender Variablen sowie in der Datenbearbeitung machen auch weiterhin Ergebnisvergleiche schwierig und manchmal unmöglich.

Auch in den letzten 15 Jahren wurden mehrere Studien zum Thema Schlaf und Fluglärm durchgeführt. Es liegen Feldstudien und Laborstudien vor sowie einige "quasi" Feldstudien, bei welchen definierter Fluglärm vor Ort in den Schlafräumen eingespielt wurde, um das Problem der Adaptation an die Schlafbedingungen zu verringern. Das Problem der "Lärmhabituation" wird in mehreren Arbeiten im speziellen bearbeitet.

Untersucht wurden sogenannte **primäre Effekte** während des Schlafes selbst. Dazu gehören Schlafstörungen (Einschlafstörungen, Änderungen der Schlaftiefe, der Schlafstadien, der Bewegungen während des Schlafes, der Aufwachhäufigkeit mittels EEG, EOG, EMG, ECG oder Aktiometer) sowie Störungen anderer physiologischer Funktionen (Blutdruckänderungen, Änderungen der Atem- und Herzaktivität, Veränderungen von Stoffwechselfunktionen, vermehrte Ausschüttung von Adrenalin, Noradrenalin und Cortisol). Weiters wurden **sekundäre Effekte (after effects)** untersucht, die am Morgen oder dem folgenden Tag zu beobachten sind (Beurteilungen der Schlafqualität, der Erholtheit/Müdigkeit, der allgemeinen Befindlichkeit, der kognitiven und psychischen Leistungsfähigkeit, der emotionalen Stabilität sowie möglicher noch andauernder Veränderungen physiologischer Funktionen) und schließlich **long term effects**, die sowohl den psychosozialen Bereich als auch den physiologischen Bereich betreffen.

In die Literaturübersicht wurden auch einige Arbeiten zu anderen Lärmquellen (Straßenverkehr) aufgenommen, wenn dadurch Ergebnisse zum Fluglärm ergänzt oder in Frage gestellt werden.

Abel 1990

Ahrlin 1988

Babisch, Fromme, Beyer, and Ising 1996

Berglund and Lindvall 1995

Bonnet 1989

Bronzaft, Ahren, Mc Ginn, O'Connor, and Savino 1998

Carter, Hunyor, Crawford, Kelly, and Smith 1994

Carter, Hunyor, and Ingham 1994

Carter, Crawford, Kelly, and Hunyor 1993

Carter 1999

Committee on aircraft noise and sleep 1991

de Jong 1993
Di Nisi, Muzet, Ehrhardt, and Libert 1990
Diamond, Jones, MacKaen, and Ollerhead 1992
Eberhardt 1999
Eberhardt 1988
Eberhardt and Akselsson 1987
Eberhardt, Strale, and Berlin 1987
Ettema 1991a
Ettema 1991b
Federal interagency committee on aviation noise (FICAN) 1997
Fidell, Howe, Tabachnick, Pearson, and Sneddon 1995
Fidell, Pearsons, Tabachnick, Howe, Silvati, and Barber 1995
Finegold 1993
Franssen, de Jong, Miedema, Vos, Walda, and Wiechen 1999
Franssen, Staatsen, Vrijkotte, Lebret, and Passchier-Vermeer 1995
Frustorfer, Pritsch, Ott, and Sturm 1988
Frustorfer, Pritsch, Pritsch, Clement, and Wesemann 1988
Gezondheidsraad: Commisie Vliegtuiglawaai en slaap 1999
Griefahn 1990a
Griefahn 1990b
Griefahn 1990c
Griefahn 1990d
Griefhan 1990
Griefhan and Gros 1986
Gruber 1992
Gunter, van-der-Zande, Wiethoff, Mulder, and Mulder 1999
HACAN and Holland 1997
Hofman 1991
Hofman, Kumar, and Eberhardt 1993
Horne, Pankhurst, Reyner, Hume, and Diamond 1994
Horne, Reyner, Pankhurst, and Hume 1995
Jansen, Linnemeier, and Nitzsche 1995
Job 1996
Jones 1992
Linnemeier 1995
Marfeffe 1997
Maschke 1992
Maschke 1994
Maschke, Breinl, Grimm, and Ising 1993
Maschke, Ising, and Arndt 1995
Maschke, Arndt, Ising, Laude, Thierfelder, and Contzen 1995b

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- Maschke and Harder 1998
Maschke, Ising, and Hecht 1997b
Maschke, Ising, and Hecht 1997a
Miedema 1993
Morrell, Taylor, and Lyle 1997
Nivison and Endresen 1993
Ollerhead, Jones, Cadoux, Woodley, Atkinson, Horne, Pankhurst, Reyner, Hume, Van, Watson, Diamond, Egger, Holmes, and McKean 1992
Öhrström 1989
Öhrström 1993b
Öhrström 1993a
Öhrström and Björkman 1988
Öhrström, Björkman, and Rylander 1990
Öhrström, Björkman, and Rylander 1999
Öhrström and Rylander 1990
Pankhurst and Horne 1994
Passchier-Vermeer 1993
Patterson and Rayman 1996
Pearson, Barber, and Tabachnick 1989
Pearson, Barber, and Tabachnick 1989
Pearson, Barber, Tabachnick, and Fidell 1995
Pfoertner 1993
Pollak 1991
Rylander 1999
Schuller and van der Ploeg 1992
Stansfeld 1992
Stevenson and McKellar 1989
Sutter 1991
Suzuki, Kawada, Ogawa, and et.al 1991
Thiessen 1988
Tulen, Kumar, and Jurriens 1986
Vallet, Oliver, and Laurens 1990
Vallet, Pauchuaudi, Bruyere, and et al 1986
Vallet and Vallet 1993
van der Ploeg I.F., Schuller, and Proceedings Euro-Noise 92 1992
Vorob'ev, Krylov IuV, Zaritskii, and Skrebnev 1996
Vorob'ev, Krylov IuV, Zaritskii, Skrebnev, and Shcherbachenko 1995
Wilkinson and Campell 1984

Wirkungen auf das Immunsystem

Mögliche Wirkungen von Fluglärm auf das Immunsystem werden in fast allen Übersichtsarbeiten angesprochen und dabei Bezug auf Ergebnisse meist experimenteller Lärmuntersuchungen genommen. Die Hypothese lärmbedingter Immunmodulation basiert einerseits auf der Tatsache, daß Lärm als Stressor anerkannt ist, andererseits eine Fülle von Daten darüber vorliegt, daß Stressoren auf verschiedene Funktionen des Immunsystems modulierend einwirken können. Nach dem derzeitigen Kenntnisstand wirkt Lärm also nicht direkt auf das Immunsystem, sondern ist als unspezifische Reaktion des Organismus zu sehen, der auf den Stressor Lärm vor allem mit einer erhöhten Ausschüttung der Glucokortikoid- und Katecholaminhormone reagiert. Cortisol führt zu einer Abnahme der Lymphozyten-Subpopulationen aber zu keiner Veränderung der Anzahl und Aktivität der Killerzellen. Hingegen führt Adrenalin zu einem starken Anstieg der Anzahl und der Aktivität der natürlichen Killerzellen (Nomoto, Karasawa, and Uehara 1994; Tonnesen, Christensen, and Brinklov 1987). Dementsprechend ist die Wirkung von Lärm auf das Immunsystem am ehesten als eine unspezifische Immunmodulation zu sehen, die, vereinfacht gesagt, zu Immunstimulation und zu Immunsuppression führen kann. In diesem Sinne sind auch die teils konträren Ergebnisse der Studien zu sehen. Für die Beurteilung der Lärmwirkungen werden hauptsächlich quantitative und qualitative Veränderungen der zellulären Komponenten des Immunsystems herangezogen.

Folgende relevante Studien konnten gefunden werden:

Aguas, Esaguy, Grande, Castro, and Castelo Branco 1999

Arck, Merali, Manuel, Chaouat, and Clark 1995

Bly, Goodard, and McLean 1993

Bomberger and Haar 1992

Castro, Aguas, Grande, Monteiro, and Castelo Branco 1999

De-Wazieres, Spehner, Harraga, Laplante, Corallo, Bloy-Ch, Dupond, Vuitton, and Seilles 1998

Folch, Ojeda, and Esquivel 1991

Irwin, Segal, Hauger, and Smith 1989

Kay, Tarcic, Poltyrev, and Weinstock 1998

Komori, Miwa, Morita, Niiya, Hamamatsu, Niwa, Komori, Sarai, and Iwata 1993

Kugler, Kalveram, and Lange 1990

McCarthy, Ouimet, and Daun 1992

Nomoto, Karasawa, and Uehara 1994

Sgoutas Emch, Cacioppo, Uchino, Malarkey, Pearl, Kiecolt Glaser, and Glaser 1994

Sieber, Rodin, Larson, Ortega, Cummings, Levy, Whiteside, and Herberman 1992

Sobrian, Vaughn, Ashe, Markovic, Djuric, and Jankovic 1997

Spehner, De-Wazieres, Nicod, HarragaS, Robert, and Seilles 1996

Tonnesen, Christensen, and Brinklov 1987

Weisse, Pato, McAllister, Littman, Breier, Paul, and Baum 1990)

Belästigung (annoyance)

Belästigung (annoyance) ist zwar grundsätzlich dem Bereich der psychologischen Lärmwirkungen zuzuordnen. Trotzdem soll dieser Themenbereich in einem eigenen Abschnitt abgehandelt werden. Kein anderer Umweltreiz führt in annähernd gleicher Weise wie unerwünschter Schall zu Belästigungs- und Gestörtheitsreaktionen, die zu massiven Störungen des Wohlbefindens und damit zu Beeinträchtigungen der Gesundheit im Sinne der WHO Definition führen. Bestehen diese Beeinträchtigungen über längere Zeiträume hinweg, so sind auch Entwicklungen im Sinne von Risikofaktoren für Erkrankungen nicht auszuschließen, wenngleich im Einzelfall solche Effekte nur schwer schlüssig nachweisbar sein werden. Unter Belästigung (annoyance) wird in diesem Zusammenhang nicht die Belästigung oder das Gestörtsein in einem speziellen Bereich (z.B. Kommunikation, Freizeitverhalten) verstanden, sondern eine integrative Beurteilung aller in einer bestimmten Situation mit der Lärmeinwirkung einhergehenden Empfindungen. Belästigung (annoyance) ist meist der primäre Anlaß für Beschwerden aus Gruppen von Lärmbetroffenen. Auch im Hinblick auf die Erstellung von Kriterien und Richtlinien zum Schutz vor Lärmbelastung muß diesem Aspekt besondere Beachtung gegeben werden.

Die Literatur zu Fragen der Belästigung durch Fluglärm ist zahlreich. Viele Autoren haben frühere Ergebnisse neu analysiert oder durch Metaanalysen versucht allgemeingültigere Aussagen machen zu können. Einige große neue Studien liegen ebenfalls vor. Mehrere Arbeiten beschäftigen sich mit der Frage welche Parameter des Fluglärms in erster Linie die Annoyance bestimmen. Dieser Frage kommt wie schon eingangs erwähnt besondere Bedeutung zu.

Abel 1990

Ahrlin 1988

Babisch, Fromme, Beyer, and Ising 1996

Babisch, Gallacher, and Ising 1995

Baettig and Buzzi 1981

Beckers 1991

Belojevic, Öhrström, and Rylander 1992

Berglund, Berglund, and Lindvall 1987

Berglund, Harder, and Preis 1994

Berglund, Hassmen, and Job 1996

Berglund and Lindvall 1995

Berglund, Preis, and Rankin 1990

Björkman, Ahrlin, and Rylander 1992

Brendel and Wendland 1998

Broeg, Haeberle, and Mettler 1982

Bullinger, Hygge, Evans, Meis, and Makensen 1999

Cohen, Evans, Stokols, and Krantz 1986

Damongeot, Dambra, and Masure 1984

de Jong 1990
de Jong 1993
Diamond and Walker 1986
Evans, Hygge, and Bullinger 1995
Felscher-Suhr, Guski, Hunecke, Kastka, Paulsen, Schumer, and Vogt 1996
Fidell 1990
Fidell, Barber, and Schultz 1991
Fidell, Green, Schultz, and Pearsons 1988
Fidell, Horonjeff, Mills, Baldwin, Teffeteller, and Pearsons 1985
Fidell, Schultz, and Green 1988
Fidell and Silvati 1991
Fidell, Silvati, Howe, Pearsons, Tabachnick, Knopf, Gramann, and Buchanan 1996
Fields 1984
Fields 1986a
Fields 1986b
Fields 1990
Fields 1992
Fields 1994
Fields 1998
Fields and Powell 1985
Fields and Walker 1982
Firle 1986
Frair 1984
Franssen, de Jong, Miedema, Vos, Walda, and Wiechen 1999
Franssen, Staatsen, Vrijkotte, Lebret, and Passchier-Vermeer 1995
Garbell 1989
Gierke and Harris 1987
Gjestland 1989
Grebner, Meloni, and Krueger 1995a
Grebner, Meloni, and Krueger 1995b
Green and Fidell 1991
Gunn 1987
Guski and Felscher-Suhr 1999
Hall 1984
Hellman 1984
Ising, Rebentisch, Poustka, and Curio 1990
Job 1996
Job 1999
Job, Topple, Hatfield, Carter, Peploe, and Taylor 1996
Jonckheere 1989
Kalveram 1995b

Kalveram 1995c
Kalveram 1995a
Kalveram 1997
Kalveram 1998
Kalveram, Drassow, and Vogt 1999
Kalveram, Wiemers, and Vogt 1999
Kret 1986
Kryter 1994
Lercher and Kofler 1993
Lercher and Kofler 1995
Lercher and Widmann 1993
Levy-Leboyer and Moser 1987a
Levy-Leboyer and Moser 1987b
Maschke and Harder 1998
Maschke, Ising, and Arndt 1995
Mauss, Vogt, and Kalveram 1998
McCurdy 1984
McCurdy and Powell 1984
Melamed, Froom, Kristal-Boneh, and Gofer 1997
Miedema and Vos 1998
Miedema and Vos 1999
Morrell, Taylor, and Lyle 1997
Nivison and Endresen 1993
N.N 1984
Öhrström, Björkman, and Rylander 1988
Pulles, Biesiot, and Stewart 1990a
Raw and Griffiths 1985
Reijneveld 1994
Ronnebaum, Schulte-Fortkamp, and Weber 1997
Rylander 1999
Rylander and Björkman 1988
Rylander and Björkman 1997
Rylander, Björkman, Ahrlin, Arntzen, and Solberg 1986
Schick and Klatte 1997
Schomer and Averbuch 1989
Schomer and Hoover 1989
Schuemer and Schuemer-Kohrs 1991
Schultz 1978
Shepherd 1987
Staatsen, Franssen, and Lebret 1994
Stansfeld 1992

Staples 1998

Sutter 1991

Taylor 1995a

Taylor 1995b

Taylor 1984

Timmerman 1986

Upadhyay and Jain 1999

Vallet 1987

Vogt, Mauss, Lahl, and Kalveram 1997

von Gierke and Harris 1987

Vos 1992;Wilshire 1984;Wilshire 1987;Wu, Lai, Shen, Yu, and Chang 1995

Störungen im Bereich der emotionalen, kognitiven, motivationalen und sozialen Funktionen, Leistungen und Verhaltensformen

Neben gesundheitlichen Gefahren und psycho-physiologischen Beeinträchtigungen durch Lärm kann es selbst bei relativ niedrigen Geräuschpegeln zu negativen psychologischen Wirkungen kommen. Unter diese psychologischen Wirkungen fallen Belästigungserlebnisse, Störungen des Wohlbefindens, Beeinträchtigung von Erholung und Entspannung, Behinderung der Kommunikation, Beeinträchtigung des Spracherwerbes, Störungen der Merkfähigkeit und der Gedächtnisleistung, Beeinträchtigung des Leistungsverhaltens durch direkte Störung oder Absenkung der Leistungsmotivation, Verminderung prosozialer Verhaltensweisen, negative Bewertung der Lebensumstände und des Lebensraumes, Erhöhung des Protest- und Aggressionsverhaltens.

Abel 1990

Ahrlin 1988

Baettig and Buzzi 1981

Belojevic, Öhrström, and Rylander 1992

Berglund, Harder, and Preis 1994

Berglund, Hassmen, and Job 1996

Bonnet 1989

Brenner, Oberacker, Kranig, and Buchwalsky 1993

Bronzaft, Ahren, Mc Ginn, O'Connor, and Savino 1998

Bullinger 1998

Bullinger and Bahner 1997

Bullinger, Hygge, Evans, Meis, and Makensen 1999

Buntin 1989

Buzzi and Baettig 1984

Chiou, Ho, and Kellogg, Jr. 1993

Cohen, Evans, Krantz, and Stokols 1980

Cohen, Evans, Stokols, and Krantz 1986

de Jong 1993

Evans 1998

Evans, Bullinger, and Hygge 1998

Evans, Hygge, and Bullinger 1995

Evans and Lepore 1993

Evans and Maxwell 1997b

Evans and Maxwell 1997a

Gomes, Martinho Pimenta, and Castelo Branco 1999

Green, Pasternack, and Shore 1982

Gunn 1987

Guski 1995
HACAN and Holland 1997
Hygge 1993
Hygge, Evans, and Bullinger 1993a
Hygge, Evans, and Bullinger 1993b
Irwin, Segal, Hauger, and Smith 1989
Ising and Rebentisch 1993a
Job 1996
Job 1993
Job, Toppo, Carter, Peplow, Taylor, Morrell, and Hill 1996
Job and Hatfield 1998
Kalveram 1995a
Kjellberg, Skoldstrom, Andersson, and Lindberg 1996
Kret 1986
Kryter 1984
Kryter 1990a
Lathela, Niemi, Kursela, and Hyper 1986
Lercher and Kofler 1995
Levy-Leboyer and Moser 1987a
Marfeffe 1997
Maschke, Ising, and Hecht 1997a
Mauss, Vogt, and Kalveram 1998
Meis 1998
Morrell, Taylor, Carter, Job, and Peplow 1999
Morrell, Taylor, and Lyle 1997
Öhrström, Björkman, and Rylander 1990
Pfoertner 1993
Poustka 1991
Poustka, Eckermann, and Schmeck 1992
Poustka and Schmeck 1996
Preuss 1989
Pulles, Biesiot, and Stewart 1990a
Remschmidt and Schmidt 1992
Rylander, Björkman, Ahrlin, Arntzen, and Solberg 1986
Schick 1992a
Schick and Klatter 1997
Schmeck 1992
Schmeck 1994
Shepherd 1987
Stansfeld 1992
Stansfeld, Sharp, Gallacher, and Babisch 1993

Stansfeld and Shine 1993a

Sutter 1991

Vallet 1987

von Gierke and Harris 1987

Wilkinson and Campell 1984

Wu, Lai, Shen, Yu, and Chang 1995

Besonders sensible Personengruppen

In den letzten Jahren wurde vermehrt angeregt, den Einfluß von Fluglärm auf besonders sensible Personengruppen zu untersuchen. Dazu gehören im speziellen Kinder, alte Personen und kranke Personen sowie Schwangere.

Halbwegs relevante Literatur liegt fast nur im Bereich der Kinder vor. Hier wurden in mehreren Ländern größere Studien durchgeführt. Dabei wurden eine breite Palette von möglichen Auswirkungen untersucht: Es wurden sowohl physiologische Parameter als auch psychologische Parameter sowie kognitive Leistungsfähigkeit, Lernfähigkeit, Spracherwerb und Verhalten erhoben.

Ando 1988

Bullinger, Hygge, Evans, Meis, and Makensen 1999

Buntin 1989

Chen and Chen 1993

Coblenz, Martel, and Ignazi 1990

Cohen, Evans, Krantz, and Stokols 1980

Cohen, Evans, Stokols, and Krantz 1986

Eberhardt 1999

Evans 1998

Evans, Bullinger, and Hygge 1998

Evans, Hygge, and Bullinger 1995

Evans and Lepore 1993

Evans and Maxwell 1997b

Evans and Maxwell 1997a

Franssen, Staatsen, Vrijkotte, Lebrecht, and Passchier-Vermeer 1995

Green, Pasternack, and Shore 1982

Hygge 1993

Hygge, Evans, and Bullinger 1993a

Hygge, Evans, and Bullinger 1993b

Ising and Rebentisch 1993b

Ising, Rebentisch, Babisch, Curio, and Sharp-Baumgartner 1990

Ising, Rebentisch, Poustka, and Curio 1990

Kret 1986

Kurppa, Rantala, Nurminen, Holmberg, and Starck 1989

Lercher and Kofler 1995

Macnab, Chen, Gagnon, Bora, and Laszlo 1995

Maschke and Harder 1998

Maschke, Ising, and Hecht 1997a

Meis 1998

Morrell, Taylor, Carter, Job, and Peploe 1998
Morrell, Taylor, Carter, Job, and Peploe 1999
Morrell, Taylor, and Lyle 1997
Pfoertner 1993
Poustka 1991
Poustka, Eckermann, and Schmeck 1992
Poustka and Schmeck 1990
Poustka and Schmeck 1996
Preuss 1989
Remschmidt and Schmidt 1992
Rosenberg 1991a
Schell and Ando 1991
Schell and Hodges 1985
Schell and Norelli 1983
Schick 1992b
Schick 1992c
Schick and Klatter 1997
Schmeck 1992
Schmeck 1994
Schmeck and Poustka 1993b
Schmeck and Poustka 1993a
Schmeck and Poustka 1994
Sponsel 1994a
Sponsel 1994b
Stolbun, Karagodina, Soldatkina, Orlova, and Bobyleva 1989
Visser, van Wijnen, Benraad, and van Leeuwen 1997
Wu, Lai, Shen, Yu, and Chang 1995
Zhang, Cai, and Lee 1992)

Foetale Entwicklung und Schwangerschaft

In den in den letzten Jahren zum Thema Fluglärm erschienenen Reviews wird vermehrt auf die Möglichkeit von Auswirkungen der Fluglärmbelastung auf Schwangerschaft und foetale Entwicklung hingewiesen. Diesen Überlegungen liegt in erster Linie die Hypothese einer lärmbedingten Vasokonstriktion und dadurch bedingten Veränderung der uteroplacentaren Durchblutung sowie einer durch Streßhormone bedingte erhöhte Kontraktivität des Uterus zugrunde. Als mögliche Folgen werden Fehlgeburten, Frühgeburten, niedriges Geburtsgewicht bis hin zu Mißbildungen bei Neugeborenen diskutiert und auf die Möglichkeit noch lange nach der Geburt nachweisbarer hormoneller Verschiebungen hingewiesen. Auch die Möglichkeit einer direkten Schädigung des Gehörorganes selbst war Gegenstand von Untersuchungen.

Wegen der bisher geringen Anzahl von Untersuchungen bei Fluglärm wurden auch Arbeiten bei denen die Auswirkungen von Arbeitslärm untersucht wurden sowie einige experimentelle Untersuchungen an Tieren aufgenommen.

Auch Reviewartikel, bei denen speziell auf diesen Themenbereich eingegangen wurde, sind angeführt.

Untersuchungen zu diesem Themenkomplex liegen von folgenden Autoren vor, wobei die Ergebnisse keineswegs einheitlich sind:

American Academy of Pediatrics: Policy Statement 1997

Ando 1988

Clarke, Wittwer, Abbott, and Schneider 1994

Coblentz, Martel, and Ignazi 1990

de Jong 1993

Dennler, Diener, and Muller 1989

Franssen and Lebret 1997

HACAN and Holland 1997

Hartikainen-Sorri, Kirkinen, Sorri, Anttonen, and Tuimala 1994

Hartikainen, Sorri, Anttonen, Tuimala, and Laara 1994

Kryter 1994

Kurppa, Rantala, Nurminen, Holmberg, and Starck 1989

Luke, Mamelle, Keith, Munoz, Minogue, Papiernik, and Johnson 1995

McDonald, McDonald, Armstrong, Cherry, Nolin, and Robert 1988

Meyer, Aldrich, and Easterly 1989

Morrell, Taylor, and Lyle 1997

Murata, Takigawa, and Sakamoto 1993

Niemtzow 1993

Nikolic, Gec, Ivanovic, Micic, Sulovic, Nikolic, Sbutega Milosevic, Belojevic, and Neskovic 1991

Nurminen and Kurppa 1989

Nurminen, Lusa, Ilmarinen, and Kurppa 1989

Peoples, Siegel, Suchindran, Origasa, Ware, and Barakat 1991

Schell 1981

Schell 1991

Schell and Ando 1991

Schell and Hodges 1985

Schwarze and Thompson 1999

Weinstock, Matlina, Maor, Rosen, and McEwen 1992

Wu, Chen, Lai, Ko, Shen, and Chang 1996

Zhang, Cai, and Lee 1992

Zoldag, Heuwieser, Grunert, and Stephan 1983

Psychische, psychiatrische, neurotische Störungen (psychische Gesundheit, mental health)

Seit Beginn der 70er Jahre wird in verschiedenen Publikationen laufend auf mögliche Beeinträchtigungen der Psychischen Gesundheit durch Fluglärm hingewiesen. In den letzten 15 Jahren liegen allerdings nicht sehr viele neue Untersuchungen zum Thema vor. Mehrere Autoren haben in dieser Periode versucht durch Reanalysen der Daten früherer Studien sowie durch Metaanalysen weitere Informationen zu erarbeiten. Wichtige neue Studien gibt es speziell im Hinblick auf Wirkungen von Fluglärm auf die psychische Gesundheit bei Kindern.

Zur Beurteilung der Wirkungen des Fluglärms auf die psychische Gesundheit werden sehr unterschiedliche Kriterien herangezogen, die auch eine graduelle Abstufung des Schweregrades der Beeinträchtigung widerspiegeln.

So wird u.a. die Häufigkeit der Einweisungen in psychiatrische Spitäler verwendet, die Inanspruchnahme von praktischen Ärzten, der (relevante) Medikamentenkonsum, das Ausmaß psychosomatischer, neurotischer oder psychotischer Beschwerden sowie Ausprägungsgrad von Angst und Depression. Es wird gefordert auch weniger gravierenden Beeinträchtigungen der psychischen Gesundheit Beachtung zu schenken, weil bisher nicht geklärt ist, ob diese Vorläufer schwerwiegenderer Erkrankungen sein können auf jeden Fall aber anzunehmen sein dürfte, daß sie die Entwicklung latenter psychischer Störungen begünstigen. Folgende Arbeiten zum Thema liegen vor:

Abel 1990

Berglund, Hassmen, and Job 1996

Branco 1999

Bullinger, Hygge, Evans, Meis, and Makensen 1999

Buzzi and Baettig 1984

de Jong 1993

Ellis, Ellis, and Mindell 1991

Ettema 1991b

Evans 1998

Evans, Bullinger, and Hygge 1998

Evans, Hygge, and Bullinger 1995

Gunn 1987

HACAN and Holland 1997

Ising, Rebentisch, Poustka, and Curio 1990

Job 1996

Job 1999

Job, Topple, Hatfield, Carter, Peploe, and Taylor 1996

Kret 1986

Kryter 1990b

Kryter 1990a

Kryter 1994
Levy-Leboyer and Moser 1987a
Marfeffe 1997
Martinho Pimenta and Castelo Branco 1999
Morrell, Taylor, and Lyle 1997
Pfoertner 1993
Poustka 1991
Poustka, Eckermann, and Schmeck 1992
Poustka and Schmeck 1990
Reijneveld 1994
Remschmidt and Schmidt 1992
Rylander, Björkman, Ahrlin, Arntzen, and Solberg 1986
Schmeck 1994
Schmeck and Poustka 1993a
Schmeck and Poustka 1994
Schwarze and Thompson 1999
Shepherd 1987
Sieber, Rodin, Larson, Ortega, Cummings, Levy, Whiteside, and Herberman 1992
Sponsel 1994b
Staatsen, Franssen, and Lebret 1994
Stansfeld 1992
Stansfeld, Gallacher, Babisch, Shipley.M., and . 1996
Vallet 1987
von Gierke and Harris 1987
Ward 1988
Weisse, Pato, McAllister, Littman, Breier, Paul, and Baum 1990

Lärmempfindlichkeit (noise sensitivity)

Im angloamerikanischen Raum wird seit einiger Zeit vermehrt das Problem der subjektiven Lärmempfindlichkeit diskutiert. Dabei wird Lärmempfindlichkeit meist als eine spezielle Erscheinungsform einer allgemeineren persönlichen Disposition verstanden. Manche Autoren differenzieren darüber hinaus noch zwischen einer allgemeinen und einer speziellen Lärmempfindlichkeit. Unterschiede in Ergebnissen der Lärmwirkungsforschung werden oft durch unterschiedliche Grade von Lärmempfindlichkeit zu erklären versucht. Solange dieses Konzept jedoch nicht verifiziert ist, muß dafür gesorgt werden, daß dieser Begriff nicht leichtfertig immer dann verwendet wird, wenn keine richtige Erklärung verfügbar ist.

Abel 1990

Belojevic, Öhrström, and Rylander 1992

Di Nisi, Muzet, Ehrhardt, and Libert 1990

Guski 1987

Job 1996

Job 1999

Job 1988

Job.R.F.S., Bullen, and Burgess 1991

Miedema and Vos 1999

Nivison and Endresen 1993

Ollerhead, Jones, Cadoux, Woodley, Atkinson, Horne, Pankhurst, Reyner, Hume, Van, Watson, Diamond, Egger, Holmes, and McKean 1992

Öhrström 1993c

Öhrström 1993b

Öhrström and Björkman 1988

Öhrström, Björkman, and Rylander 1988

Öhrström, Björkman, and Rylander 1990

Öhrström, Björkman, and Rylander 1999

Pulles, Biesiot, and Stewart 1990b

Reijneveld 1994

Rylander 1999

Schick 1992c

Schick and Klatte 1997

Smith and Stansfeld 1986

Stansfeld 1992

Stansfeld, Clark, Turpin, Jenkins, and Tarnopolsky 1985

Stansfeld, Sharp, Gallacher, and Babisch 1993

Stansfeld and Shine 1993a

Stansfeld and Shine 1993b

Auswirkungen von militärischem Tieffluglärm

Von Tiefflügen spricht man bei Flugbewegungen unter 300 m Höhe. Neben der geringen Höhe unterscheiden sich vor allem die bei militärischen Tiefflügen auftretenden Schallimmissionen grundsätzlich von denen des normalen Flugverkehrs. Unter anderem sind Stärke und Frequenz der auftretenden Maximalpegel, die gesamte Frequenzverteilung, die Anstiegszeiten, die Gesamtdauer des Schallereignisses sowie die Pegelverläufe verschieden. Zusätzlich ist zu bedenken, daß militärische Tiefflüge auch Regionen betreffen, die ferne von Flughäfen sind und unter Umständen sogar im weiteren Sinne Erholungsregionen zuzuzählen wären. Ähnliches gilt für Überflüge mit Überschallknall, doch liegen hier bisher relativ wenige Untersuchungen vor.

Militärische Tiefflüge sind für manche Regionen, wie Rosenberg 1991 und Spreng 1990 zeigten, keine seltenen Einzelereignisse. In Deutschland gibt es Regionen mit durchschnittlich 50 täglichen Überflügen und Spitzen von 211 Überflügen pro Tag. Wenn auch in Österreich militärische Tiefflüge selten sind, sollte man doch grundsätzlich die möglichen Auswirkungen beachten

Auswirkungen des Tieffluglärms wurden in Feldstudien und in Laborexperimenten an Menschen und Tieren untersucht, und zwar jeweils Akutwirkungen und Langzeitwirkungen. Gegenstand der Untersuchung waren Veränderungen der Herz-Kreislaufaktivität, biochemische Veränderungen, Veränderungen von corpuskulären Blutkomponenten, Beeinträchtigung des Hörvermögens (Hörschwellenverschiebungen, Auftreten von Tinnitus), das Auftreten von Angst sowie psychischen und psychosomatischen Störungen und Verhaltensweisen.

Baxter, West, and Miller 1989

Brenner, Oberacker, Kranig, and Buchwalsky 1993

Curio and Ising 1986

de Jong 1990

Ellis, Ellis, and Mindell 1991

Fidell, Pearsons, Tabachnick, Howe, Silvati, and Barber 1995

Gehrig, Meyer, Ising, Kuhl, Schmidt, and Grutzmacher 1993

Gierke and Harris 1987

Griefahn 1990b

Ishi, Ising, Merker, Stenzel, and Wenzel 1993

Ising, Curio, Otten, Rebentisch, and Schulte 1991

Ising and Michalak 1990

Ising and Rebentisch 1992

Ising, Rebentisch, Babisch, Curio, and Sharp-Baumgartner 1990

Ising, Rebentisch, Poustka, and Curio 1990

Michalak, Ising, and Rebentisch 1990

Pfoertner 1993

Poustka 1991

Poustka and Schmeck 1990

Preuss 1989

Pulles, Biesiot, and Stewart 1990a

Rosenberg 1991b

Schmeck 1992

Schmeck 1994

Spreng 1990

Spreng 1993

Spreng, Leupold, and Emmert 1988

von Gierke and Harris 1987

Vorob'ev, Krylov luV, Zaritskii, and Skrebnev 1996

Dosis-Wirkungsbeziehungen (dose-response relations)

Abschließend sei noch kurz auf die Problematik der Aufstellung von Dosis-Wirkungsbeziehungen im Bereich der Fluglärmwirkungsforschung hingewiesen. Für viele Wissenschaftler und Politiker erscheint der Nachweis klare Dosis-Wirkungsbeziehungen eine notwendige Voraussetzung für die Erarbeitung von Richt- und Grenzwertvorschlägen. Viele theoretische Konzepte wurden daher zu diesem Thema entwickelt und ihre Überprüfung in Feld und Laborstudien versucht. In vielen der oben beschriebenen Studien wurden solche Berechnungen, oft unter Verwendung von Metaanalysen, durchgeführt. Auf sie wird bei der weiteren Bearbeitung der zusammengetragenen Literatur besondere Rücksicht genommen werden.

ABSCHLIESSENDE BEMERKUNGEN

Obgleich versucht wurde, die seit 1985 erschienene Literatur zu gesundheitsrelevanten Fragen des Fluglärms möglichst vollständig zu erfassen, sind einige Arbeiten, wie z.B. Doppelpublikationen und teilweise graue Literatur hier nicht enthalten. Im Rahmen der im Jahr 2000 geplanten Aufarbeitung der zusammengestellten Literatur wird dieses Material und die im zweiten Teil des Jahres 1999 erschienen Arbeiten berücksichtigt werden.

LITERATURLISTE

1. **Abel,SM** (1990): The extra-auditory effects of noise and annoyance: an overview of research. *J.Otolaryngol.* 19 Suppl 1: 1-13.
Ref ID: 30

Abstract: This paper is an overview of research on the extra-auditory effects of exposure to noise. The aim is to demonstrate the pervasiveness of the effects in support of noise reduction at the source for reasons that go well beyond hearing conservation. The areas discussed are performance effects, including vigilance, selective attention, sensory-motor behavior and memory; physical effects, including cardiovascular disease and sleep-related disorders, and annoyance, with special reference to psychological outcomes. The results show that high levels of noise are particularly disruptive for dual-task paradigms, requiring attention sharing, and sequential responding, involving speed and accuracy. Both the level and the type of noise background affect memory, severely limiting the number of stimulus dimensions that may be simultaneously encoded and retained. Community noise with a preponderance of heavy traffic and aircraft flyovers affects sleep, resulting in changes in the normal pattern of EEG fluctuations, and increases in movement and heart rate. Lastly, noise causes annoyance, with its own set of by-products: job dissatisfaction, irritability and anxiety over potential risk JOURNAL-ARTICLE; REVIEW; REVIEW-LITERATURE 1990244352 199008
2. **Aguas,AP, Esaguy,N, Grande,N, Castro,AP, Castelo Branco,NA** (1999): Effect low frequency noise exposure on BALB/c mice splenic lymphocytes. *Aviat.Space.Environ.Med.* 70: A128-31.
Ref ID: 511
3. **Ahrlin,U** (1988): Activity disturbances caused by different environmental noises. *J.Sound Vib.* 127: 599-603.
Ref ID: 215

Abstract: An analysis was made of data obtained in investigations performed on annoyance reactions due to noise from aircraft, trains and road traffic. The aims of the analysis were to study the covariation between the extent of activity disturbances and general annoyance, to compare different noise sources with reference to activity disturbances caused, and to study the relation between the extent of annoyance reactions and noise exposure. The activity disturbances studied were speech interference effects, adverse effects on rest and sleep and awakening. Common to all three noise sources is that the extent of all activity disturbances increased with increased general annoyance. However, the rank order between effects was different. In areas exposed to aircraft and train noise, speech interference was the effect reported by the largest proportion of respondents. Road traffic noise primarily disturbed rest and sleep. As regards train noise, it was demonstrated that although the extent of activity disturbances was comparatively high, the extent of general annoyance was lower on the whole than the extent of activity disturbances. These differences in responses may be due to differences in attitudes towards the noise sources. Even though actual noise-related effects were experienced, the degree of subjective annoyance may be determined by the type of noise source causing the effects. The dose-response relationship established for aircraft and train noise demonstrated that the extent of general annoyance varied although the noise conditions were similar. The differences were further accentuated with increasing dB(A) levels. The results from the analysis demonstrated that the use of response indices based upon different activity interferences must take into account the variations that are present between different noise sources. Weighting all activity interferences into an index and applying this universally for all noises will decrease the precision of the response description and hence influence the accuracy of the dose-response relationship
4. **Altena,K.** Medische gevlogen van Lawaai. VROM (ed). GA-HR-03-01. 1989. Leidschendam.
Ref Type: Report
Ref ID: 596

5. **Alves,PM** (1999): Noise-induced extra-aural pathology: A review and commentary. *AVIAT.SPACE ENVIRON.MED.* 1999; 70: A7-A21.
Ref ID: 205

Abstract: The focus of this review paper will be the effects of acoustic phenomenon (noise), characterized by large pressure amplitude (>90 dB) and low frequency (<500 Hz) (LPALF) on humans and animal models. Current concepts imply the assumption that such LPALF noise impinges only on, or through, the somatic medium of the auditory system. As a consequence of this assumption, the effect of noise on humans is only regulated for purposes of hearing conservation. Guidelines and regulations governing occupational noise assessments are biased toward the subjective human perception of sound. The author will not make the assumption that airborne acoustic phenomena impacts only on the auditory system, and will present a literature review providing evidence for such position. The purpose of this review paper is to defend the existence of extra-aural, noise-induced pathology, particularly the vibroacoustic disease; and to advance the recognition that the respiratory tract could very well be a target organ of this environmental stressor

6. **American Academy of Pediatrics: Policy Statement** (1997): Noise: A hazard for the fetus and newborn (RE9728). *Pediatrics* 100.
Ref ID: 497

Abstract: Noise is ubiquitous in our environment: High intensities of noise have been associated with numerous health effects in adults, including noise-induced hearing loss and high blood pressure. The intent of this statement is to provide pediatricians and others with information on the potential health effects of noise on the fetus and newborn. The information presented here supports a number of recommendations for both pediatric practice and government policy.

Results of the cited studies suggest that: (1) exposure to excessive noise during pregnancy may result in high frequency hearing loss in newborns, and may be associated with prematurity and intrauterine growth retardation, (2) exposure to noise in the NICU (Incubatoren) may result in cochlear damage and (3) exposure to noise and other environmental factors in the NICU may disrupt the normal growth and development of premature infants.

On the bases of these studies results, noise-induced health effects on fetuses and newborns merit further study as clinical and public health concerns.

7. **Ando,Y** (1988): Effects of daily noise on fetuses and cerebral hemisphere specialization in children. *J.Sound Vib.* 127: 411-417.
Ref ID: 255

Abstract: This paper first provides an overview of work by the author and colleagues on effects of noise on fetuses demonstrating growth inhibition. As a second issue, the effects of daily noise on the mental abilities of children are discussed in relation to task specification of cerebral hemispheres. Two different types of mental tasks were given to a total of 1286 children (7-10 years old) who live in a noisy area around an international airport or in a neighbouring quiet area, under conditions of no sound, jet-plane noise stimulus and music stimulus. In the quiet neighborhood, results may support a model that noise and calculation tasks are separately processed in the right and left cerebral hemisphere, respectively. Music perception and calculation are considered to be processed one after the other in the left hemisphere. In the pattern search task used as the right hemispheric task, no significant differences appeared under either stimulus sound, with the exception of a slight interference observed in the noise group. In the noisy living area, however, effects of temporary sound on mental tasks appeared to be quite different from the first-mentioned results. These facts suggest that daily noise affects the development of cerebral specialization of growing children. As little is known about effects of noise on growing children, it is recommended that international cooperation be initiated to establish the need for and conditions of healthy sound environments

8. **Arck,PC, Merali,FS, Manuel,J, Chaouat,G, Clark,DA** (1995): Stress-triggered abortion: inhibition of protective suppression and promotion of tumor necrosis factor-alpha (TNF-alpha) release as a mechanism triggering resorptions in mice. *Am.J.Reprod.Immunol.* 33: 74-80.
Ref ID: 519

9. **Babisch,W** (1985): [Noise as a risk factor concept in cardiovascular diseases] Lärm im Risikofaktorenkonzept kardiovaskularer Krankheiten. *Schriftenr. Ver. Wasser. Boden. Lufthyg.* 63: 123-135.
Ref ID: 94
10. **Babisch,W** (1993b): Traffic noise as a risk factor for myocardial infarction. In Ising,H, Kruppa,B, editors. *Noise and disease*. Stuttgart: Gustav Fischer, pp 158-178.
Ref ID: 578
11. **Babisch,W** (1993a): Verkehrslärm als Risikofaktor für Herzinfarkt. *Schriftenr. Ver. Wasser. Boden. Lufthyg.* 88: 135-166.
Ref ID: 585
12. **Babisch,W**. Epidemiological studies of the cardiovascular effects of traffic noise: Proceedings of the 7th International congress on noise as a public health problem (Noise effects 98). Job, R. F. S and Carter, N. L. (eds). 1, 221-229. 1998. Sydney/Australia, Pty.Ltd.
Ref Type: Conference Proceeding
Ref ID: 415
13. **Babisch,W, Elwood,PC, Ising,H** (1992): Zur Rolle der Umweltepidemiologie in der Lärmwirkungsforschung, Verkehrslärm als Risikofaktor für Herzinfarkt. *Bundesgesundheitsblatt* 35: 130-133.
Ref ID: 589
14. **Babisch,W, Elwood,PC, and Ising,H**. Road traffic noise and heart disease risk: Results of the epidemiological studies in Caerphilly, Speedwell and Berlin. Proceedings of the 6th International Congress on Noise as a Public Health Problem. Vallet, M. (ed). 3, 260-267. 1993. Arcueil, Cedex, France, INRETS.
Ref Type: Conference Proceeding
Ref ID: 579
15. **Babisch,W, Fromme,H, Beyer,A, and Ising,H**. Katecholaminausscheidung im Nachturin bei Frauen aus unterschiedlich verkehrbelasteten Wohngebieten. 9/96. 1996. Berlin, Umweltbundesamt; Institut für Wasser-Boden- und Lufthygiene.
Ref Type: Report
Ref ID: 368

Abstract: Bestimmung der Katecholaminausscheidung (Adrenalin und Noradrenalin bezogen auf Kreatininausscheidung) bei 200 Frauen Alter 30-45Jahre. Teil einer grösseren Studie N=800. Einmalige Urinprobensammlung. Wohnungen mit Fenster zur Strasse. Lärmbelastung geschätzt aufgrund des Verkehrsaufkommens. Schätzung 45-75 dB (A) bezogen auf die Häuserfronten. Multiple Regressionsanalysen: Signifikanter Zusammenhang zwischen Noadrenalinausscheidung und Verkehrsaufkommen. Pro Verzehnfachung des Verkehrsaufkommens fand sich eine um 0.61mg/gKreatinin höhere NoradrenalinKonzentration im Urin (logarithmisches Modell). Ein Anstieg um 10.000 Kfz/Tag) war mit einem Anstieg um 0.81 x/g Kreatinin verbunden (lineares Modell). Personen, die an Strassen wohnten mit mehr als 17.000/Kfz/tag hatten im Gruppenmittel um 2.47xg/gKreatinin höhere Noradrenalinwerte als jene mit < 17.000Kfz/Tag (kategoriales Modell). Diese Effekte zeigten sich ausschließlich in Bezug auf Belastung des Schlafrumes, nicht des Wohnraumes. Störungen der Kommunikation und Störungen des Schlafes (subjektive Ebene) : Stark und sehr stark gestörte Personen hatten höhere Noradrenalinwerte als weniger gestörte Personen. Alle diese Werte wurden nur in Bezug auf Störung bei geschlossenen Fenstern nicht im Zusammenhang mit Störungen bei geöffneten Fenstern gefunden. Positive Zusammenhänge zwischen Grad der Störung des Schlafes durch lärm bzw. Lärmbelästigung nachts und Lärmbelästigung durch Verkehr mit der Höhe der Noradrenalinausscheidung. Die Studienergebnisse unterstützen die Hypothese, dass chronische Verkehrsbelastung dauerhafte Stressreaktionen hervorruft. Insbesondere Schlafstörungen scheinen hierbei eine Rolle zu spielen. Grundsätzlich könnten neuroendokrine Stressreaktionen auf eine erhöhtes Herz-Kreislaufisiko hinweisen. (Schätzung der Lärmbelastung erscheint etwas sehr grob. Anstieg des Mittelungspegels um 3dB bei Verdopplung der KFZ Anzahl! Wenn Strassenkapazität ausgelastet müsste mit mehr Lärm gerechnet werden, weil langsamer-weiters ist anzunehmen, da die Art der KFZ differiert in stark bzw. schwach befahrenen Strassen. Knapp. Englisch Abstract vorhanden)

16. **Babisch,W, Gallacher,J, Ising,H** (1995): Schallpegel oder subjektive Störung? Lärmexpositionsmaße in Wirkungsstudien am Beispiel einer Kohortenstudie. (Noise level or annoyance? Measures of noise exposure in health studies: a cohort study). *Bundesgesundheitsblatt* 38: 137-145.
Ref ID: 360

Abstract: In an epidemiological cohort study the relationship between objective (sound pressure level) and subjective (annoyance) traffic exposure and incidence of ischaemic heart disease (IHD) is investigated. In comparison of extreme groups of noise exposure categories, non-significant relative risks between 1.1 and 1.3 are found for the traffic noise level (average A-weighted sound pressure level, 6-22h: 66-70dB(A) vs.51-55 dB(A)) and relative risks between 0.9 and 1.4 (different items) for annoyance ratings (often + always disturbed vs. never disturbed). When room orientation and window opening habits are considered, the relationship between traffic noise and IHD risk is increased. The impact of disease prevalence on subjective noise ratings (overreporting), and the implication of both noise measures in environmental research and public health policy is discussed.
17. **Babisch,W and Gallacher,JEJ.** Traffic noise, blood pressure and other risk factors: The Caerphilly and Speedwell collaborative heart disease studies; Proceedings of the 5th International Congress on Noise as a Public Health Problem. Berglund, B. and Lindvall, T. (eds). 4, 315-326. 1990. Stockholm, Swedish Council of Building Research.
Ref Type: Conference Proceeding
Ref ID: 580
18. **Babisch,W, Gallacher,JEJ, Elwood,PC, Ising,H** (1988): Traffic noise and cardiovascular risk. The Caerphilly study, first phase. Outdoor noise levels and risk factors. *Arch. Environ. Health* 43: 407-414.
Ref ID: 582
19. **Baettig,K, Buzzi,R** (1981): Psychophysiologische Effekte von Lärm und Beschäftigung in der Heimsituation Psychophysiological effects of noise and activity in the home situation. *Zeitschrift fuer Experimentelle und Angewandte Psychologie* 28: 1-14.
Ref ID: 316

Abstract: ABE: Skin conductance, respiration, and electrocardiogram of 16 persons living in close vicinity to an airport, were recorded continuously for periods of about one hour and a half, under field conditions of different noise levels. During the periods of recording, the subjects were required to fill in questionnaires, take a concentration test, scale the annoyance caused by the noise, relax, and talk with the experimenter, in a scheduled sequence. The data obtained for each successive period of ten seconds were separately averaged. The statistical treatment of the obtained data included cluster analysis, and calculation of Kendall correlations, auto-correlations, and linear regressions. The results brought out significant differences in the physiological correlates of different mental activities. Significant cluster displacements occurred for overflights and accidental noise in the case of the majority of the subjects. The results confirm the hypothesis that cognitive factors and vegetative reaction modify the physiological responses to noise. The results show further that neither the psychophysiological reactions to noise, nor the subjective feeling of annoyance due to noise, show any habituation effects.
20. **Baxter,JD, West,R, Miller,A** (1989): Will the increased military low-level flying activity in Labrador be detrimental to the hearing of humans in the region? *J. Otolaryngol.* 18: 68-73.
Ref ID: 5

Abstract: The Government of Canada has directed the Department of National Defence to encourage our NATO allies to increase use of their facilities at Goose Bay, Labrador. This has already resulted in a substantial increase in the amount of military flying in the area, and more is projected. Much of the flying is done at very low altitude. The aboriginal people in the region (the Innu and, to a lesser extent, the Inuit) are demanding a halt to low-level military flying, and their representatives claim that the noise from the low-flying jet aircraft can cause hearing loss and ear disease. A survey on the ground in the area measured noise levels up to 127.7 dBA with very brief exposure levels. A task force commission to look at the problem concluded that occasionally low-level subsonic overflights might produce noise levels that were potentially damaging to hearing, but that the probability of this happening is at present

very low because of the low frequency of flights. This might change if the frequency of flights increases

21. **Beckers,JH** (1991): Fuehren weniger laute Flugzeuge zu einem Rueckgang der Fluglaermprobleme? Do fewer loud airplanes lead to a reduction of air traffic noise? *Zeitschrift fuer Laermbekaempfung* 38: 109-113.

Ref ID: 331

Abstract: German ABG: Im Anschluss an eine graphische Darstellung der allgemeinen Laermbelaestigung der Bevoelkerung in der Bundesrepublik Deutschland sowie der Belaestigung durch Fluglaerm werden drei Thesen zur Wirkung von Fluglaerm vorgetragen und begruetet. Sie beziehen sich auf unterschiedliche Arten von Fluglaerm, auf unterschiedliche Arten des Zustandekommens von Dauerschallpegeln sowie auf interindividuelle Unterschiede hinsichtlich der Auswirkungen von Fluglaerm. Beispielhaft werden die Entwicklung der Verkehrssituation und die Entwicklung der Laermemissionen am Flughafen Duesseldorf sowie eine Prognose der zukuenftigen Entwicklung dargestellt. Es wird darauf hingewiesen, dass auch bei relativ niedrigen Dauerschallpegeln mit starken Stoerungen und Beeintraechtigungen bei Personen, die Fluglaerm ausgesetzt sind, zu rechnen ist. Abschliessend werden Konsequenzen fuer die weitere Laermbekaempfung aufgezeigt. (Jutta Rohlmann - ZPID)

annoyance & impairments caused by air traffic noise; noise emissions at Duesseldorf airport; significance of noise abatement measures

22. **Belojevic,G, Öhrström,E, Rylander,R** (1992): Effects of noise on mental performance with regard to subjective noise sensitivity. *Int.Arch.Occup.Environ.Health* 64: 293-301.

Ref ID: 489

Abstract: zwei Lärmstärken + Ruhe, 4 cognitive tasks, lärmempfindliche und nicht-lärmempfindliche Personen (Weinsteins noise sensitivity scale), 23 Männer 22 Frauen, noise sensitivity war der ausschlaggebende Faktor für gefundene Veränderungen

23. **Berglund,B, Berglund,U, Lindvall,T** (1987): Measurement and control of annoyance. *Dev.Toxicol.Environ.Sci.* 15: 29-44.

Ref ID: 347

24. Berglund,B, Harder,K, Preis,A (1994): Annoyance perception of sound and information extraction. *J.Acoust.Soc.Am.* 95: 1501-1509.

Ref ID: 346

Abstract: The judgment of annoyance of distorted speech differs radically for different language groups. The results show that those who do comprehend a spoken language, base their annoyance-judgments on the informational content extracted while those who do not base it on the perceptual characteristics of meaningless sound (particularly loudness). A series of distorted German speech sounds were presented to two subject groups consisting of native Swedish and English speakers, and the results were compared with earlier results from groups of native German and Polish subjects. The 50 stimuli were generated from the very same speech signal distorted in two principle ways, either with repeated silent gaps or superimposed noise impulses. The perceived annoyance of the distorted speech was judged both by category scaling for all subject groups, and as a control for "ceiling" effects, also by magnitude estimation for the Swedish and the English subjects. There is a pronounced tendency for German subjects to judge the German speech distorted with silent gaps as more annoying than that distorted with superimposed noise impulses. In contrast, the Swedish, English, and Polish subjects judged the two German- speech distortions in reversed order with regard to annoyance. Thus for noncomprehending listeners, noise-distorted speech is more annoying but for comprehending listeners it is speech distorted by gaps. This means that impaired communication intrusiveness rather than loudness predominates in annoyance judgments from comprehending listeners

25. **Berglund,B, Hassmen,P, Job,RF** (1996): Sources and effects of low-frequency noise. *J.Acoust.Soc.Am.* 99: 2985-3002.

Ref ID: 56

Abstract: The sources of human exposure to low-frequency noise and its effects are reviewed. Low-frequency noise is common as background noise in urban environments, and

as an emission from many artificial sources: road vehicles, aircraft, industrial machinery, artillery and mining explosions, and air movement machinery including wind turbines, compressors, and ventilation or air-conditioning units. The effects of low-frequency noise are of particular concern because of its pervasiveness due to numerous sources, efficient propagation, and reduced efficacy of many structures (dwellings, walls, and hearing protection) in attenuating low-frequency noise compared with other noise. Intense low-frequency noise appears to produce clear symptoms including respiratory impairment and aural pain. Although the effects of lower intensities of low-frequency noise are difficult to establish for methodological reasons, evidence suggests that a number of adverse effects of noise in general arise from exposure to low-frequency noise: Loudness judgments and annoyance reactions are sometimes reported to be greater for low-frequency noise than other noises for equal sound-pressure level; annoyance is exacerbated by rattle or vibration induced by low-frequency noise; speech intelligibility may be reduced more by low-frequency noise than other noises except those in the frequency range of speech itself, because of the upward spread of masking. On the other hand, it is also possible that low-frequency noise provides some protection against the effects of simultaneous higher frequency noise on hearing. Research needs and policy decisions, based on what is currently known, are considered

26. **Berglund,B, Lindvall,Th** (1995): *Community noise* . Stockholm, Sweden: Stockholm University and Karolinska Institute.
Ref ID: 436
27. **Berglund,B, Preis,A, Rankin,K** (1990): Relationship between loudness and annoyance for ten community sounds. *ENVIRON.INT.* Environment-Internat: 523-531.
Ref ID: 345

Abstract: The aim of this experiment was to investigate the relationship between perceived annoyance and perceived loudness for complex community sounds. The two perceptual attributes were scaled by the method of magnitude estimation. In all, forty subjects scaled ten different tape recorded sounds presented at two different Zwicker loudness values. The results show that for physically loud sounds only the perceived annoyance may be exchanged for perceived loudness, while for physically soft sounds, the perceived annoyance deviates greatly from perceived loudness. Thus, for physically soft sounds, more attention is paid to other aspects of the sound, such as the perceptual counterpart of the physical parameter sharpness, than to the loudness-related sound pressure level. This means that the physically determined Zwicker loudness is inappropriate to use for predicting the perceived annoyance of complex sounds Journal
28. **Björkman,M, Ahrlin,U, Rylander,R** (1992): Aircraft noise annoyance and average versus maximum noise levels. *Arch.Environ.Health* 47: 326-329.
Ref ID: 65

Abstract: A questionnaire study was performed in seven areas located around the airports of Landvetter and Save, Gothenburg, in an attempt to elucidate the extent of annoyance in populations exposed to aircraft noise. Noise exposure was estimated as the energy equivalent level (Aircraft Noise Level--FBN) or as the number of aircraft with levels that exceeded 70 dBA, combined with the maximum noise level. The results were compared with data obtained from the earlier Scandinavian Aircraft Noise Investigation. The results supported the conclusion that the annoyance reaction is better related to the number of aircraft and the maximum noise level than to energy equivalent levels for noise exposure
29. **Bly,St, Goodard,M, and McLean,J.** A review of the effects of noise on the immune system: Proceedings of the 6th International Congress on noise as a public health problem. INRETS (ed). 2, 509-512. 1993. Arcueil,Cedex,Fance, Vallet,M.
Ref Type: Conference Proceeding
Ref ID: 525
30. **Bomberger,CE, Haar,JL** (1992): Restraint and sound stress reduce the in vitro migration of prethymic stem cells to thymus supernatant. *Thymus* 19: 111-115.
Ref ID: 59

Abstract: Murine bone marrow cells were examined in an in vitro assay to determine whether stress modulates the migration of prethymic stem cells to thymus supernatant. Adult CBA/J mice were either restraint or sound stressed for two hours daily for five days. Bone marrow cells were removed and migrated toward newborn thymus supernatant in an in vitro migration assay in blind well chambers. Bone marrow cells from animals which had been stressed for five days showed a significant decrease in the percent migration to thymus supernatant when compared to bone marrow cells from age-matched control mice. This suggests that either a smaller proportion of precursor cells are available in the bone marrow for migration to the thymus or the number of cells remains the same but these cells are less responsive to chemoattractive factors in the supernatant, thus causing them to migrate at a decreased rate

31. **Bonnet,MH** (1989): Infrequent periodic sleep disruption: effects on sleep, performance and mood. *Physiology and Behaviour* 45: 1049-1055.
Ref ID: 570

32. **Branco,NAAC** (1999): The clinical stages of vibroacoustic disease. *AVIAT.SPACE ENVIRON.MED.* 70: A32-A39.
Ref ID: 164

Abstract: Background: Vibroacoustic disease (VAD) is an occupational disease occurring in susceptible workers who have had long-term exposure (> 10 yr) to large pressure amplitude (>90 dB SPL) and low frequency noise (<500 Hz). The clinical progression is insidious, and lesions are found in many systems throughout the body. Some of the findings, such as extracellular matrix changes, appear to be specific to this disease. Others, such as cognitive impairment, seem to be common in different types of stress-induced pathology. In 1956, Professor Eugenia Andreeva-Galanina developed a classification of hand-arm vibration-induced pathology. This has been further refined and has become an important tool in occupational medicine. Thus, it is also important now to define the clinical stages of VAD in accordance with the appearance of the most common signs and symptoms. Methods: We analyzed the files of 140 patients with VAD, paying close attention to the chronology of the clinical findings, the registry of eventual and on-the-job accidents, and the evaluation of disabilities. Results: We have classified VAD in function of the time it took for 50% of the population to acquire the relevant sign or symptom. Stage I, mild signs (behavioral and mood associated with repeated infections of the respiratory tract, e.g.; bronchitis); Stage II, moderate signs (depression and aggressiveness, pericardial thickening and other extracellular matrix changes, light to moderate hearing impairment, and discrete neurovascular disorders); Stage III, severe signs (myocardial infarction, stroke, malignancy, epilepsy, and suicide). Conclusion: This classification should be capable of assessing work fitness, and is a primary approach to a complex and multidisciplinary problem with implications in diagnosis, prevention and disability compensation within VAD

33. **Branco,NAAC, Aguas,AP, Pereira,AS, Monteiro,E, Fragata,JIG, Tavares,F et al** (1999): The human pericardium in vibroacoustic disease. *AVIAT.SPACE ENVIRON.MED.* 1999; 70: A54-A62.
Ref ID: 258

Abstract: Introduction: One of the main features of vibroacoustic disease (VAD) is the proliferation of the extra-cellular matrix which induces cardiovascular morphological and dynamic changes, and has been evaluated through echo- Doppler. While all subjects exposed to large pressure amplitude (>90 dB SPL) and low frequency (<500 Hz) (LPALF) for at least 15 yr have thickening of some cardiac structure, most frequently the pericardium, no significant diastolic changes accompany these observations. Echocardiography has become the diagnostic method of choice for the VAD. However, there have been no studies relating the echo-images of pericardial thickening to gross anatomy. Methods: We present the histology and ultrastructure of the pericardia of four patients who underwent cardiac surgery. Results: The most important findings concern the real thickening of the pericardium (values: 1.11, 1.35, 2.19, and 2.33 mm vs. norm: <0.5 mm), the dynamic arrangements of mesothelial cells in the serosa layer, and the plasticity of the cells found among the multifascicular waveform collagen fibers. We found that the fibrosa of VAD patients has three layers: sandwiched between two thickened layers of normal fibrosa there is a loose tissue layer with vascular, nervous, and adipose structures. Conclusion: These features may partially explain

why no important diastolic changes are observed in VAD patients in spite of the pericardium thickening

34. **Branco,NAAC, Rodriguez,E, Alves,PM, Jones,DR** (1999): Vibroacoustic disease: Some forensic aspects. *AVIAT.SPACE ENVIRON.MED.* 1999; 70: A145-A151.

Ref ID: 235

Abstract: Background: Vibroacoustic disease (VAD) is an insidious environmental entity caused by occupational exposure to large pressure amplitude and low frequency (LPALF) noise (>90 dB SPU <500 Hz). Significant disabilities may result, and issues of worker's compensation should be openly discussed and settled. Toward this goal, a rigorous review of all available information on this disease was undertaken in order to document the need to define industrial exposure standards, and to settle on the diagnostic procedures that will help distinguish the VAD from other, similar conditions. Methods: We reviewed the medical files of 236 male Caucasians employed as aircraft technicians who had been diagnosed with VAD and monitored for at least 15 yr. The natural history of the disorder was studied in detail, emphasizing the clinical diagnostic criteria and the outcome of disabilities. Results: Among the 236 cases, 172 (73%) were disabled after an average of 24 yr (SD = 6.9) of occupational exposure. The primary categories of disabilities were neurological (81, 34%), malignant (28, 11.9%), psychiatric (23, 9.7%), cardiovascular (16, 6.8%), and osteoarticular (14, 5.9%). After the onset of industrial exposure to LPALF noise, the minimum time for these disabilities to manifest themselves was 16 yr. The most serious complication was multiple attempted suicide. Such attempts were fortunately rare (5, 2.1%) and successful only once. Echocardiograms showed characteristic changes in pericardial structures, involving proliferation of the extracellular matrix, lack of cilia and five pericardial layers instead of three. This has been studied in pericardial biopsy material obtained during coronary bypass surgery for coronary insufficiency (six cases), and by autopsy (four cases). Discussion: These findings appear to be pathognomonic for the VAD, and the echocardiogram has been confirmed as a fundamental diagnostic tool. The degree of disability due to VAD can be determined from Portuguese national disability tables, which cover almost all of the VAD-induced disabilities. However, these tables do not specify LPALF noise as an occupational hazard, rendering them inapplicable to VAD patients. Also, suicide, a most serious psychiatric consequence, is not covered by these tables. Such situations highlight the absolute necessity to recognize LPALF noise as the cause of VAD, and as an industrial hazard

35. **Brendel,E, Wendland,HH** (1998): Guidelines for the determination and assessment of aircraft noise near airfields by the Landerausschuss fur Immissionsschutz. *Z.Lärmbekämpf.* 1998; 45: 181-184.

Ref ID: 219

Abstract: Although considerable progress has been made in aircraft noise control, there has not been a notable reduction in the noise impact on the people living in the vicinity of airports. Therefore, apart from technical, routine and company-keeping measures, it must also remain an important goal to achieve a minimum protection from aircraft noise by planning. So far, no nation-wide method was available allowing the determination of noise contours for the designation of planning areas and settlement limitation areas near existing and planned airports, which was harmonized and qualified. In several states, different specifications were made for the various aspects, which, due to a lack of co-ordination and/or comprehensive consideration in the establishing of municipal and state development plans, have led to an uncertainty in the implementation from the point of view of immission control. The following article gives an account of the guidelines for the determination and assessment of aircraft noise near airfields [1; 2] as established by the Landerausschuss fur Immissionsschutz (Immission control committee of the states). These guidelines now present a nation-wide harmonized recommendation for the determination of settlement limitation areas. The method for the determination of noise contours proposed in these guidelines is essentially based upon DIN 45643-1 [7], a modified 'Anleitung zur Berechnung von Lärmschutzbereichen... (AzB)' [5] (Guideline for the calculation of noisy areas) and a modified 'Datenerfassungssystem ... (DES)' (System for data collection) [8]. The method departs from the actual annoyance due to aircraft noise. It allows a comparison of the effects of aircraft noise with those of other types of noise, and ensures long-term planning certainty for municipal development planning, because the number of flying events to be considered refers to the intended final state of the civil or military airfield or landing site in question. Both guidelines are now a basis for a harmonized procedure to be followed by the immission

control authorities of the states. The presented procedure enables a consequent calculation of the noise in the vicinity of airfields, resulting from all types of aircraft

36. **Brenner,H, Oberacker,A, Kranig,W, Buchwalsky,R** (1993): A field study on the immediate effects of exposure to low- altitude flights on heart rate and arrhythmia in patients with cardiac diseases. *Int.Arch.Occup.Environ.Health* 65: 263-268.

Ref ID: 13

Abstract: Noise from low-altitude military flights differs from most other sources of noise by virtue of its unpredictability in space and time, its very high maximal levels, and the fast increase in noise level at high flight speeds. While this makes low-altitude flights a frightening and annoying experience, the potential immediate health hazards for exposed individuals with preexisting cardiovascular disease are unclear. A field study on the immediate effects of exposure to low-altitude flights on heart rate and arrhythmia was conducted among patients of a rehabilitation clinic for cardiac diseases in the summer of 1990 in Bad Rothenfelde, Germany. Twenty-four hour electrocardiograms of 68 patients taken on days when low-altitude overflights with peak sound pressure levels above 95 dB(A) were registered on the flat roof of the clinic were analyzed for changes in the heart rate or the occurrence of ventricular extrasystoles in four 2-min periods before, around, and after the overflights. Overall, 149 "overflight events" were included in the analysis. No major changes in the heart rate or in the frequency of ventricular extrasystoles were observed, but this could be partly due to problems inherent in the field approach. Nevertheless, the potential effects on heart rate and arrhythmia of low-altitude flights appear to be of limited magnitude compared to the potential effects of other factors, such as psychological or physical exposures, and they are probably too small to be proven under field conditions in an observational epidemiologic study in Germany following the limitations placed on the frequency and altitude of flights in September

37. **Broeg,W, Haeberle,GF, Mettler,MB** (1982): Vergleich der Laestigkeit von Strassenverkehrs- und Fluglaerm Comparison of experienced annoyance caused by street traffic noise and air traffic noise. *Interview und Analyse* 9: 326-333.

Ref ID: 333

Abstract: Strassenverkehrslaerm gestoert, sondern die Stoerung durch Strassenverkehrslaerm war auch insGerman ABG: Es wird untersucht, ob die bei der objektiven Messung von Laermemissionen verwendeten Mittelungspegel in der Lage sind, Ruhepausen oder Laermintervalle so zu beruecksichtigen, wie das menschliche Ohr und Stoerempfinden dies vermutlich tun. Zu diesem Zweck werden zwei Laermquellen mit gleichem Mittelungspegel, aber unterschiedlichen Ruhepausen (Strassenverkehrslaerm als kontinuierlicher Laerm und Fluglaerm als Intervallaerm mit mehr oder minder grossen Ruhepausen) in ihrer Wirkung auf die Beschallten verglichen. Es wurde eine Versuchsanordnung gewaehlt, in der ein und dieselbe Stichprobe nacheinander Flug- und Strassenverkehrslaerm gleichen Mittelungspegels unter vergleichbaren Bedingungen erlebte und zum Stoerempfinden befragt wurde. Dabei wurde bewusst auf eine Laborsituation verzichtet, da diese - abgesehen vom akustischen Element - niemals der Realitaet vergleichbare situative Bedingungen herstellen kann und insofern zu verzerrenden Ergebnissen fuehren muss. Der Vergleich der beiden Laermquellen bestaetigte mit ueberraschender Eindeutigkeit die Ausgangshypothese, wonach die unterschiedlichen Laermquellen - trotz des gleichen Mittelungspegels - im Stoerempfinden der Beschallten sich hoechst unterschiedlich darstellen. So fuehlten sich nicht nur deutlich mehr Personen vom gesamt staerker. Es wird jedoch darauf hingewiesen, dass die Untersuchung nur bei einer kleinen Fallzahl von 107 Personen durchgefuehrt wurde und aufgrund ihrer Versuchsanordnung langfristig erlebte Laermvorerfahrungen nicht beruecksichtigen konnte.

38. **Bronzaft,AL, Ahren,K, Mc Ginn,R, O'Connor,J, Savino,B** (1998): Aircraft noise: a potential health hazard. *Environment and behavior* 30: 101-113.

Ref ID: 471

Abstract: A questionnaire distributed to two groups, one living within the flight pattern of a major airport and the other in a non-flight area sought to determine whether these groups would respond differently to questions pertaining to noise, health perception and quality of life issues. Nearly 70% of the residents living within the flight corridors reported themselves bothered by aircraft noise. Aircraft noise, in contrast to other bothersome noises, interfered

more frequently with daily activities. Subjects who were bothered by aircraft noise were more likely to complain of sleep difficulties and more likely to perceive themselves in poorer health. The studie's finding of a possible relationship between noise and adverse health effects might encourage policy makers to enact pending antinoise legislation and to fund further noise research

39. **Bullinger,M** (1998): Zum Einfluss wahrgenommener Umweltbedingungen auf die subjektive Gesundheit Impact of perceived environmental conditions on subjective health. In Kals,E, editor. *Umwelt und Gesundheit. Die Verbindung oekologischer und gesundheitlicher Ansaetze, Psychologie Verlags Union, Weinheim, 1998, Seiten 83-98*: Psychologie Verlags Union, Weinheim, pp 83-98.

Ref ID: 317

Abstract: German ABG: Der Einfluss wahrgenommener Umweltbedingungen auf die subjektive Gesundheit wird betrachtet. Als Probleme der bisherigen medizinischen bzw. psychologischen Forschungsansaezte werden die Operationalisierung von Gesundheit bzw. die Identifikation gesundheitsrelevanter Umweltbedingungen genannt. Mechanismen der Wirkung von Umweltbedingungen auf den Menschen werden diskutiert (Modell der Noxe, der Attribution und der Stresstransaktion). Integrative Forschungsbemuehungen, welche auch Aspekte der erlebten Umwelt sowie der subjektiven Gesundheit beruecksichtigen, werden beschrieben. Zwei Studien zur Beziehung zwischen subjektiver Gesundheit und erlebter Umwelt werden vorgestellt. Im Rahmen der Muenchener Fluglaermstudie bzw. der Muenchener Public Health Studie wurden 353 bzw. 774 Familien hinsichtlich ihres Wohlbefindens, ihrer subjektiven Gesundheit und zur Wahrnehmung der Umweltbedingungen befragt. Als Ergebnisse werden zusammenfassend genannt: (1) Unterschiede in der Bewertung der Lebensqualitaet kovariierten mit dem Grad an Umweltbelastungen im Wohngebiet, (2) hinsichtlich der Belaestigung durch Umweltbedingungen bzw. der eingeschaeetzten Beeintraechtigung von Wohlbefinden und Gesundheit durch Umweltbedingungen wirkte die empfundene Qualitaet der Umwelt als Mediator. Methodische sowie inhaltliche Aspekte der Befunde werden diskutiert.

40. **Bullinger,M, Bahner,U** (1997): Erlebte Umwelt und subjektive Gesundheit Eine Untersuchung an Muettern und Kindern aus unterschiedlich laermbelasteten Gebieten Perceived environment and subjective health. *Zeitschrift fuer Gesundheitswissenschaften* 3. Beiheft: 89-108.
Ref ID: 319
- Abstract: German ABG: Ergebnisse einer epidemiologischen Laengsschnittstudie zum Zusammenhang zwischen subjektiver Gesundheit und erlebter Umwelt werden vorgestellt. Daten wurden bei 666 Familien mit 13- bis 15jaehrigen Kindern und ihren Muettern erhoben, die in fluglaermbelasteten und nicht belasteten staedtischen und laendlichen Regionen Sueddeutschlands leben. Die Untersuchung wurde als Telefoninterview durchgefuehrt, in der Subskalen des "SF-36 Health Surveys", der SF-12, der Fragebogen "Muenchner Lebensqualitaetsfragen fuer Kinder", eine Lebenszufriedenheitsliste und neu entwickelte Skalen zu umwelt- und gesundheitsbezogenen Kontrollueberzeugungen sowie eine Reihe von Verfahren zur Erfassung weiterer psychosozialer Praediktoren subjektiver Gesundheit einbezogen wurden. Die Analyse der ersten Befragungswelle zeigte, dass fluglaermexponierte Kinder und ihre Muetter im Vergleich zu den anderen Gruppen in Abhaengigkeit der Belaestigung durch Umweltbedingungen eine eingeschraenkte subjektive Gesundheit, besonders im Bereich "Psychisches Wohlbefinden", berichteten. Regressionsanalysen zeigten, dass das allgemeine Stressempfinden, aber auch koerperliche Beschwerden, Lebensereignisse und Kontrollueberzeugungen eine substantielle Varianz der subjektiven Gesundheit - bei den Muettern mehr als bei den Kindern - erklaerten. Im Vergleich zu diesen Praediktoren war die Rolle der Umweltbelaestigung insgesamt weniger wichtig, wobei sich im fluglaermbelasteten Gebiet die Fluglaermbelaestigung auf die subjektive Gesundheit auswirkte. Zusammenfassend zeigen die Daten, dass Belaestigungen durch Umweltbedingungen berichtet werden, dass die Belastungen des Alltagsleben aber bei Erwachsenen und Kindern einen groesseren Einfluss auf Wohlbefinden und Funktionsfaehigkeit haben.
41. **Bullinger,M, Hygge,S, Evans,GW, Meis,M, Makensen,S** (1999): The psychological cost of aircraft noise for children. *Zentralblatt fuer Hygiene und Umweltmedizin* 202: 127-138.
Ref ID: 369
- Abstract: The current study took advantage of a natural experiment caused by the opening of a major new airport, exposing children in a formerly quiet area to aircraft noise. In this longitudinal prospective investigation, which employed nonexposed control groups, effects of aircraft noise prior to and subsequent to inauguration of the new airport as well as effects of chronic noise and its reduction at the old airport (6 and 18 month post relocation) were studied in 326 children aged 9 to 13 years. The psychological health of children was investigated with a standard quality of life scale as well as with a motivational measure derived from the Glass and Singer stress aftereffects paradigm. In addition a self report noise annoyance scale was used. In the children studied at the two airports at over three time points results showed a significant decrease of total quality of life 18 month after aircraft noise exposure as well as a motivational deficits operationalized by fewer attempts to solve insoluble puzzles in the new airport area. Parallel shifts in children's attributions for failure were also noted. At the old airport in parallel impairments were present before the airport relocation but subsided there after. These findings are in accord with reports of impaired psychological health after noise exposure and indicate the relevance of monitoring psychological parameters as function of environmental stressors among children.
42. **Buntin,J**. Criteria for acceptable aircraft noise exposures in classrooms. Proceedings of the Int.Conference on Noise Control Engineering, Newport Beach,CA. 2, 873-876. 1989. Poughkeepsie,NY, Noise Control Foundation.
Ref Type: Conference Proceeding
Ref ID: 384
43. **Buzzi,R, Baettig,K** (1984): Extraaurale beziehungsweise vegetative Effekte von Umweltlaerm Extraaural and vegetative effects of environmental noise. In Schick,A, Walcher,K-P, editors. *Beitraege zur Bedeutungslehre des Schalls. Ergebnisse des 3. Oldenburger Symposions zur Psychologischen Akustik, Lang, Bern, 1984, Seiten 243-251* Series: *Europaeische Hochschulschriften, Reihe 39, Interdisziplinaere Kongressberichte,*

Band 1.

Ref ID: 294

44. **Carter,NL** (1999): Transportation noise, sleep and possible after effects. *Environ Int* 22: 105-116.
Ref ID: 494
45. **Carter,NL, Crawford,G, Kelly,D, and Hunyor,S.** Environmental noise during sleep and sympathetic arousal assessed by urinary catecholamines: Proceedings of the 6th International Congress on Noise as a Public Health Problem. Vallet, M. (ed). 3, 388-392. 1993. Arcueil, Cedex, France, INRETS.
Ref Type: Conference Proceeding
Ref ID: 590
46. **Carter,NL, Hunyor,SN, Crawford,G, Kelly,D, Smith,AJ** (1994): Environmental noise and sleep--a study of arousals, cardiac arrhythmia and urinary catecholamines. *Sleep*. 17: 298-307.
Ref ID: 12

Abstract: Nine adult subjects with documented cardiac arrhythmia were studied during 4 nights of sleep in a laboratory. A sleep polygraph and single-channel electrocardiogram were recorded continuously throughout each night. After the 1st night's familiarization, the subjects were presented with 1 night each of 50 calibrated aircraft or truck noise events. One other night was noise-free. Intervals containing noise and paired quiet intervals were examined for sleep stage at interval onset, number of sleep stage changes and ventricular premature contractions (VPCs). Overnight urinary catecholamines were also assayed. It was found that noise increased the likelihood of arousal responses to the same extent in all sleep stages ($p < 0.05$). Four subjects showed frequent VPCs during the experiment. These VPCs were significantly related to sleep stage ($p < 0.05$) but not to noise events. Excretion of urinary catecholamines did not differ between noise and quiet nights JOURNAL-ARTICLE 0 1995063567 199502
47. **Carter,NL, Hunyor,SN, Ingham,PTK** (1994): A field study of the effects of traffic noise on heart rate and cardiac arrhythmia during sleep. *J Sound Vib* 169: 211-227.
Ref ID: 537
48. **Castro,AP, Aguas,AP, Grande,NR, Monteiro,E, Castelo Branco,NA** (1999): Increase in CD8+ and CD4+ T lymphocytes in patients with vibroacoustic disease. *Aviat.Space.Environ.Med.* 70: A141-4.
Ref ID: 510

Abstract: Some workers employed by the aviation industry are exposed to large pressure amplitude and low frequency (LPALF) noise ($> \text{or } = 90 \text{ dB SPL}$, $< \text{or } = 500 \text{ Hz}$) and have developed vibroacoustic disease (VAD), a whole-body noise-induced pathology. Since VAD patients have an increased prevalence of respiratory and skin infections, we investigated whether these individuals had any quantitative changes in the number of peripheral blood cell populations. Also, we investigated whether different types of noise environments are related to cell quantification. METHODS: Quantification of peripheral blood cell populations was performed in venous blood samples of 34 VAD- diagnosed patients, and 41 controls. Leukocytes, monocytes, granulocytes, and surface phenotypes of CD8+ and CD4+ T lymphocytes were considered. RESULTS: We found that VAD patients showed a statistically significant elevation in the number of circulating CD8+ and CD4+ T lymphocytes when compared with the control population, but not when compared among different noise-environments. Monocyte and granulocyte populations did not register significant differences. CONCLUSION: VAD patients present enhancement in the number of circulating cytotoxic T lymphocytes (CD8+ and CD4+ T cells) thus indicating that this environmental disease is associated with quantitative changes in immune cells
49. **Cavatorta,A, Falzoi,M, Romanelli,A, Cigala,F, Ricco,M, Bruschi,G et al** (1987): Adrenal response in the pathogenesis of arterial hypertension in workers exposed to high noise levels. *J Hypertension Suppl.* 5: 463-466.
Ref ID: 584

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50. **Chen,TJ, Chen,SS** (1993): Effects of aircraft noise on hearing and auditory pathway function of school-age children. *Int.Arch.Occup.Environ.Health* 65: 107-111.
Ref ID: 45
- Abstract: This study was conducted to investigate the influence of high- frequency aircraft noise on the function of the auditory system of school-age children. A total of 228 students attending a school near an airport (school A) and 151 students attending a school far from an airport (school B) were analyzed. Audiometry and brainstem auditory evoked potential (BAEP) detection were performed in all subjects to evaluate cochlear and retrocochlear function. The results of audiometry indicated that hearing ability was significantly worse in the children of school A, which was located under the flight paths. The values of pure tone average, high pure tone average, and threshold at 4 kHz were all higher in children who were frequently exposed to aircraft noise. There was no consistent difference in BAEP latencies between the two schools. These results indicate that central transmission is not affected in children who have been exposed to aircraft noise for several years. The results of the present study showed a significant association between aircraft noise exposure and prevalence of noise-induced hearing loss. Although damage to peripheral cochlear organs was confirmed in school-age children, involvement of the central auditory pathway could not be verified
51. **Chiou,WY, Ho,BL, Kellogg,DL, Jr.** (1993): Hazard potential of ejection with canopy fragmentation. *Aviat.Space.Environ.Med.* 64: 9-13.
Ref ID: 46
52. **Clarke,AS, Wittwer,DJ, Abbott,DH, Schneider,ML** (1994): Long-term effects of prenatal stress on HPA axis activity in juvenile rhesus monkeys. *Dev Psychobiol.* 27: 257-269.
Ref ID: 500
- Abstract: The effect of stress to the pregnant mother on hormonal responses of the offspring to stressful events was investigated in juvenile rhesus monkeys. Six pregnant monkeys were repeatedly removed from their home cages and exposed to unpredictable noise during mid- to late gestation (Days 90-145 postconception), while six undisturbed pregnant mothers served as controls. Blood samples were collected from the juvenile offspring under anesthesia on four occasions and assayed for ACTH and cortisol. In a second experiment, blood samples were collected from the awake offspring under a baseline and four progressively stressful conditions. Offspring of stressed mothers showed higher ACTH and cortisol levels than control offspring at all four anesthesia samples and at a nonanesthetized home cage baseline. Prenatally stressed offspring also showed higher ACTH values in all four stress conditions. Cortisol values were similar for the two groups under the stress conditions. The disparity between the two groups in the relationship between ACTH and cortisol was greatest in the most stressful condition, suggesting regulatory differences between the two groups. These results indicate that offspring of primate mothers stressed during pregnancy show enhanced HPA axis responsivity to stressors later in life, and concur with rodent findings indicating that prenatal stress may have long-term effects on HPA axis regulation
53. **Coblentz,A, Martel,A, and Ignazi,A.** Effects of fetal exposition to aircraft noise on birth weight of children. Proceedings of the 34th Meeting of the Human Factors Society. Human Factors Society (ed). 562-565. 1990. Santa Monica, CA.
Ref Type: Conference Proceeding
Ref ID: 509
54. **Cohen,S, Evans,GW, Krantz,DS, Stokols,D** (1980): Physiological, motivational and cognitive effects of aircraft noise on children: Moving from laboratory to the field. *American Journal of Psychology* 35: 231-243.
Ref ID: 350
55. **Cohen,S, Evans,GW, Stokols,D, Krantz,DS** (1986): *Behavior, health, and environmental stress* . New York: Plenum Press.
Ref ID: 338

56. **Committee on aircraft noise and sleep.** Aircraft noise and sleep. The Hague:Heath Council of the Netherlands, publication 1991/05. 1991.
Ref Type: Report
Ref ID: 485
57. **Curio,C and Ising,H.** Gesundheitliche Auswirkungen des militärischen Tieffluglärms-Vorstudie. Umweltbundesamt (ed). 86-10501112. 1986. Berlin, Umweltbundesamt.
Ref Type: Report
Ref ID: 610
58. **Curio,I, Michalak,R** (1993): Results of a low-altitude flight noise study in Germany: acute extraaural effects. *Schriftenr. Ver.Wasser.Boden.Lufthyg.* 88: 307-321.
Ref ID: 16

Abstract: This paper begins by outlining the aims which our study into the acute effects of low-altitude flight noise set out to achieve. The key question here concerns the relationship between noise parameters (maximum sound level and sound level rise rate) and specific reactions by the individuals affected. The subjects, healthy volunteers, were exposed via earphones to digitally recorded MLAF noise, using sophisticated recording technology. Their reactions were studied on various levels ranging from the subjective experience of negative effects through startle reactions to changes in the cardiovascular and endocrine systems. It emerged that a high sound level rise rate is a physical parameter which leads not only to more physical symptoms being cited by the subjects, but also to more pronounced myokinetic effects of an objectively measurable nature. Studies of circulation physiology were also conducted to throw light on the haemodynamic mechanism of the startle reaction. The findings suggest that increases in cardiac output per minute in a startled subject with a healthy circulation need not necessarily lead to protracted increases in blood pressure. A counter-regulation occurs by means of vasculomotory responses in the muscle. Should this regulatory system be impaired, as may be the case with elderly people, for example, blood pressure increases of up to 45 mm Hg over the initial value may ensue. A sensitization is observed after repeated exposure, with the startle reaction intensifying or else being triggered off by lower sound levels. The sensitization of startle reactions is neuro-physiologically associated with unpleasant or fear-inducing environmental stimuli. Together with the observed increases in plasma hydrocortisone and changes in magnesium metabolism of a type characteristic of stress, this phenomenon of sensitization enables us to establish the hypothetical link between specific acute reactions to MLAF noise and long-term health effects
59. **Damongeot,A, Dambra,F, and Masure,B.** Towards a better understanding of helicopter external noise. American Helicopter Society, Annual Forum. 445-457. 1984. St.Louis,MO.
Ref Type: Conference Proceeding
Ref ID: 385
60. **De-Wazieres,B, Spehner,V, Harraga,S, Laplante,F, Corallo,F, Bloy-Ch et al** (1998): Alteration in the production of free oxygen radicals and proinflammatory cytokines by peritoneal and alveolar macrophages in old mice and immunomodulatory effect of RU 41740 administration. Part I: Effect of short and repetitive noise stress. *Immunopharmacology* 39: 51-59.
Ref ID: 526

Abstract: Hopital Jean Minjoz, Service de Medecine Interne et Immunologie Clinique, Besancon Cedex, 25030, Fr AB: The aim of this study was to analyze the effects of stress on natural immunity in old mice, and the potential of an immunomodulating drug to correct stress-induced immune abnormalities. We analyzed both the alveolar (ALM) and peritoneal macrophage (PerM) oxidative responses and cytokine productions of TNF-.alpha. and IL-1.alpha., in old mice after exposure to 3 days of noise stress, with and without treatment with RU 41740, an immunomodulating compd. Prodn. of Free Oxygen Radicals (FOR) by ALM and PerM macrophages was evaluated using a luminol-dependent chemiluminescence method at the basal state and after stimulation. Serum corticosterone was also measured. Three groups of 22-24 mo-old C57BL/6 mice were studied. Seven mice were treated with RU 41740 (10 mg kg⁻¹) every day for 5 days and then exposed to sound stress (110 dB, 1000 Hz, for 3 nights). Ten mice were treated with saline, then submitted to a sham stress. Eight animals received neither treatment nor stress. This study shows that, in aged mice, auditory

stress is assocd. with modifications of macrophage functions which are different, depending on their localization and on the function under study. It confirms the immunomodulatory capacities of RU 41740 that was shown to counteract these effects of stress in elderly animals RN: 50-22-6 (Corticosterone).

61. **de Jong,RG** (1990): Community response to noise: A review of recent developments. *ENVIRON.INT.* 1990; 16: 515-522.

Ref ID: 198

Abstract: This paper reviews recent developments in the field of noise research. In our society the sources of noise pollution are increasing, as is annoyance. In research, specific attention has been paid to noise originating from motor vehicles and other surface transport, and also from aircraft, especially military aircraft and helicopters. As yet, the issue of the existence of one universal, single, dose-response relationship has remained unsolved, although some new nuances have been added. Changes in annoyance resulting from changes in noise levels are unlikely to be predicted from dose-response relationships established in 'steady state' situations. Some progress has been made in developing models to predict noise annoyance from a combination of sources. It will be necessary to develop and test a theoretical framework for annoyance and its correlations, and to explore the relationship between annoyance and stress theories

62. **de Jong,RG** (1993): Review: extraaural health effects of aircraft noise. *Schriftenr.Ver.Wasser.Boden.Lufthyg.* 88: 250-270.

Ref ID: 19

Abstract: The number of aircraft movements in our society is increasing at a rapid rate. As a consequence the airspace is becoming more crowded, in particular in the vicinity of airports. As a consequence pollution (both air pollution and noise) near the airports increases. One solution to 'rush hours' in the airspace around airports is to spread the number of flights more evenly over time. This leads to more flights in the sensitive parts of the day: evening and night. This leads to community reaction and places the potential health effects of noise in the focus of societal attention. Human functioning is affected by noise in many ways. Effects of noise become detectable at a relatively low noise level, approx. 30 dB(A). Above which noise levels and under what conditions these effects become threatening to health is still largely unknown. This holds true for cardiovascular effects, mental health, mortality rates, medicine consumption, pregnancy, delivery and physical development. On some aspects more certainty exists. Night time noise when it causes people to wake up or prevents them from falling asleep, or when it frequently disturbs the structure of sleep below the waking level, can be detrimental to health. Both for awakening reactions and for annoyance, exposure-response relations are rather well established. Reading ability is hampered by noise. For the vegetative aspects, no clear and stable exposure-response relations are known at this moment. Hopefully this conference will fill in the gap JOURNAL-ARTICLE; REVIEW; REVIEW,-TUTORIAL 1993212300 199307

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64. **Di Nisi,J, Muzet,A, Ehrhardt,J, Libert,JP** (1990): Comparison of cardiovascular responses to noise during waking and sleeping in humans. *SLEEP* 13: 108-120.

Ref ID: 538

65. **Diamond,ID, Jones,C, MacKaen,J, and Ollerhead,J.** Sleep disturbance due to aircraft noise: social survey report. SRSG (92) 8. 1992. Southampton University Department of Social Statistics; UK.

Ref Type: Report

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66. **Diamond,ID and Walker,JG.** An international study of the influence of residual noise on community disturbance due to aircraft noise. International Conference on Noise Control Engineering, Cambridge, MA. 2, 941-946. 1986. Cambridge,MA.

Ref Type: Conference Proceeding
Ref ID: 386

67. **Eberhardt,JL.** The disturbance by road traffic noise of the sleep of prepubertal children as studied in the home. Proceedings of the 5th International Congress on noise as a public health problem. Berglund, B. and Lindvall, T. (eds). 5, 65-79. 1999. Swedish Council for Building Researchc.
Ref Type: Conference Proceeding
Ref ID: 553
68. **Eberhardt,JL** (1988): The influence of road traffic noise on sleep. *J Sound Vib* 127: 449-455.
Ref ID: 564
69. **Eberhardt,JL and Akselsson,KR.** The disturbance by road traffic noise of the sleep of young male adults as recorded in the home. *J.Sound Vib.* 114, 417-434. 1987.
Ref Type: Journal (Full)
Ref ID: 40
70. **Eberhardt,JL, Strale,LO, Berlin,MH** (1987): The influence of continuous and intermittent traffic noise on sleep. *J Sound Vibr* 116: 445-464.
Ref ID: 568
71. **Editorial** (1992): Health effects of the noise of low-flying aircrafts. *Z.Lärmbekämpfung* 1992; 39: 52-54.
Ref ID: 248
72. **Ellis,DH, Ellis,CH, Mindell,DP** (1991): Raptor responses to low-level jet aircraft and sonic booms. *ENVIRON.POLLUT.* 1991; 74: 53-83.
Ref ID: 192
Abstract: We estimated effects of low-level military jet aircraft and mid- to high-altitude sonic booms (actual and simulated) on nesting peregrine falcons (*Falco peregrinus*) and seven other raptors by observing their responses to test stimuli, determining nesting success for the test year, and evaluating site reoccupancy rates for the year following the tests. Frequent and nearby jet aircraft passes: (1) sometimes noticeably alarmed birds, (2) occasionally caused birds to fly from perches or eyries, (3) most often evoked only minimal responses, and (4) were never associated with reproductive failure. Similarly, responses to real and simulated mid- to high-altitude sonic booms were often minimal and never appeared productivity limiting. Eighteen (95%) of 19 nest sites subjected to low-level jet flights and/or simulated sonic booms in 1980 fledged young during that year. Eighteen (95%) of 19 sites disturbed in 1980 were reoccupied by pairs or lone birds of the same species in 1981. We subjected four pairs of prairie falcons (*Falco mexicanus*) to low-level aircraft at ad libitum levels during the courtship and incubation phases when adults were most likely to abandon: all four eyries fledged young. From heart rate (HR) data taken via a telemetering egg at another prairie falcon eyrie, we determined that stimulus-induced HR alterations were comparable to rate changes for birds settling to incubate following flight. While encouraging, our findings cannot be taken as conclusive evidence that jet flights and/or sonic booms will have no long-term negative effects for other raptor species or for other areas. In addition we did not experiment with totally naive wild adults, rotary-winged aircraft or low-level sonic booms

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Ref ID: 581

74. **Esler,M, Jennings,G, Lambert,G, Meredith,I, Horne,M, Eisenhofer,G** (1990): Overflow of catecholamine neurotransmitters to the circulation: source, fate, and function. *Physiol Rev* 70: 963-985.
Ref ID: 539

75. **Ettema,JH** (1991a): Sleep and nocturnal air traffic. *Ned.Tijdschr.Geneeskd.* 135: 1667-1668.
Ref ID: 459
76. **Ettema,JH** (1991b): Sleep and nightly air traffic. *Ned.Tijdschr.Geneeskd.* 135: 1667-1668.
Ref ID: 292
77. **Evans,GW** (1998): Environmental Stress and health. In Baum,A, Revenson,T, Singer,JE, editors. *Handbook of Health Psychology.* Hillsdale NJ: Erlbaum.
Ref ID: 340
78. **Evans,GW, Bullinger,M, Hygge,S** (1998): Chronic noise exposure and physiological response: A prospective study of children living under environmental stress Chronische Laermbelastung und physiologische Reaktion: Eine prospektive Untersuchung an Kindern, die Umweltstress ausgesetzt sind. *Psychological Science* 9: 75-77.
Ref ID: 305
- Abstract: Investigated psychophysiological stress and quality of life of children chronically exposed to aircraft noise in a prospective study over 2 years. Participants were 217 3rd- and 4th-grade children (mean age 9.90 years at outset) with normal hearing, living either within or outside the noise impact zone of the new international airport in Munich, Germany, matched for socioeconomic status. Six months before, 6 months after, and 18 months after the airport opening the children's resting blood pressure and overnight epinephrine and norepinephrine excretion were measured and participants completed the Muenchner Lebensqualitaetsfragebogen fuer Kinder (KINDL), a questionnaire assessing the quality of children's daily life. Compared with the quieter communities, resting blood pressure and urinary catecholamine were elevated in the children living within the noise impact zone of the airport after it opened and these children's perceived quality of life dropped markedly after 18 months. The findings indicate that ambient noise levels well below those producing hearing damage significantly elevate stress among children. (Vivien Kitteringham - ZPID)
- prospective study of psychophysical stress & quality of life in children chronically exposed to aircraft noise; resting blood pressure & epinephrine & norepinephrine before vs after opening of new airport; KINDL; 217 3rd & 4th graders with mean age of 9.90 years matched for socioeconomic status living in communities within vs outside noise-impacted zone of new airport
79. **Evans,GW, Hygge,S, Bullinger,M** (1995): Chronic noise and psychological stress Chronischer Laerm und psychischer Stress. *Psychological Science* 6: 333-338.
Ref ID: 307
- Abstract: Studied the psychophysiological, cognitive, motivational, and emotional effects of chronic noise exposure on young children. 135 third- and fourth-graders (mean age 11 years) living in either a high-noise (near an airport) or a low-noise urban neighborhood and matched for socioeconomic status were included in the study. Children showed no auditory damage. Dependent measures included blood pressure; overnight urinary epinephrine, norepinephrine, and cortisol; indices of attention, memory, and reading; task motivation; noise annoyance; and quality of life. Chronic exposure to noise was related to elevated neuroendocrine markers of stress, slightly increased resting systolic blood pressure, elevated baseline indices and diminished cardiovascular reactivity to challenge, poorer long-term memory performance, reading deficits, reduced sensitivity to distracting background noise, less persistence in task performance when challenged, and lower ratings of quality of life, particularly in the psychological domain. (
80. **Evans,GW and Lepore,SJ.** Nonauditory Effects of Noise on Children: A Critical Review. *Children's environments* 10[1], 31-51. 1993.
Ref Type: Journal (Full)
Ref ID: 364
- Abstract: Large numbers of children both in the United states and throughout the economically developing world are chronically exposed to high levels of ambient noise. Although a great deal is known about chronic noise exposures and hearing damage, much less is known about nonauditory effects of chronic ambient noise exposure on children. To estimate the risk of ambient noise exposure to healthy human development more information about and attention to nonauditory effects is needed. This article critically reviews existing

research on nonauditory effects of noise on children; develops several preliminary models of how noise may adversely affect children; advocates an ecological perspective for future research agenda.

81. **Evans,GW, Maxwell,L** (1997b): Chronic noise exposure and reading deficits: The mediating effects of language acquisition. *Environment and behavior* 29: 638-656.
Ref ID: 455

Abstract: First- and second grade school children chronically exposed to aircraft noise have significant deficits in reading as indexed by standardized reading test administered under quiet conditions. These findings indicate that the harmful effects of noise are related to chronic exposure rather than interference effects during the testing session itself. We also provide evidence that the adverse correlation of chronic noise with reading is partly attributable to deficits in language acquisition. Children chronically exposed to noise also suffer from impaired speech perception, which, in turn, partially mediates the noise-exposure-reading deficit link. All of these findings statistically controlled for mothers education. Furthermore children in this study were prescreened for normal hearing by standard audiometric examination.

82. **Evans,GW, Maxwell,L** (1997a): Chronic noise exposure and reading deficits; The mediating effects of language acquisition. *Environment and behavior* 29: 638-656.
Ref ID: 337

Abstract: First and second-grade schoolchildren chronically exposed to aircraft noise have significant deficits in reading as indexed by standardised reading test administered under quiet conditions. These findings indicate that harmful effects of noise are related to chronic exposure rather than interference during the testing session itself. We also provide evidence that the adverse correlation of chronic noise with reading is partially attributable to deficits in language acquisition. Children chronically exposed to noise also suffer from impaired speech perception, which, in turn, partially mediates the noise-exposure-reading deficit link. All of these findings statistically controlled for mothers education and income. Furthermore, the children in this study were prescreened for normal hearing by standard audiometric examination.

83. **Federal interagency committee on aviation noise (FICAN)**. Effects of aviation noise on awakenings from sleep. 1-7. 1997. Federal interagency committee on aviation noise (FICAN).
Ref Type: Report
Ref ID: 532

84. **Felscher-Suhr,U, Guski,R, Hunecke,M, Kastka,J, Paulsen,R, Schumer,R et al** (1996): A methodological study concerning the actual registration of everyday activities and their disturbances due to aircraft and road traffic noise. *Z.Lärbekämpf.* 43: 61-68.
Ref ID: 179

Abstract: Between January and August 1994 an interdisciplinary survey was carried out in Dusseldorf and Ratingen concerning the disturbance of everyday activities due to aircraft and road traffic noise. We selected four residential areas with similar ecological conditions but different levels of aircraft noise or road traffic noise (66/70 dB (A) L(eq)). Besides using conventional retrospective noise disturbance and annoyance questionnaires, we sampled the noise disturbance of the actual activities several times a day by phone. At the same time, we measured the 3-min- $L_{A,eq}$ and the $L_{A,1}$. Results: Outdoor activities revealed the highest susceptibility to noise. The coherence of noise and annoyance was closer for the traffic noise areas than for the aircraft noise areas. Most probably, this means that the aircraft noise stress is not adequately described by average values per hour. The highest peaks of reported annoyance by the phone method were lower than the annoyance reported in noise annoyance questionnaires. This might be due to the interpersonal relationship of the interviewer and the interviewed persons, which established in the course of the procedure

85. **Fidell,S**. An historical perspective on predicting the annoyance of noise exposure. Reducing the annoyance of noise. Busch-Vishniac, I. (ed). 1990. Austin, National Conference on Noise Control Engineering. University of Texas.

Ref Type: Conference Proceeding
Ref ID: 97

86. **Fidell,S, Barber,DS, Schultz,TJ** (1991): Updating a dosage-effect relationship for the prevalence of annoyance due to general transportation noise. *J.Acoust.Soc.Am.* 89: 221-233.
Ref ID: 50

87. **Fidell,S, Green,DM, Schultz,TJ, and Pearsons,KF.** A strategy for understanding noise-induced annoyance. Bolt, Beranek and Newman Inc. (ed). AD-A200125 BBN-6337, 1-121. 1988. Canoga Park,CA,USA, NASA.
Ref Type: Report
Ref ID: 388

88. **Fidell,S, Horonjeff,R, Mills,J, Baldwin,E, Teffeteller,S, Pearsons,K** (1985): Aircraft noise annoyance at three joint air carrier and general aviation airports. *J.Acoust.Soc.Am.* 77: 1054-1068.
Ref ID: 76

Abstract: The results of social surveys conducted near three airports that support both general aviation and scheduled air carrier operations are presented and discussed. Inferences supported by these data include: The nature of noise exposure and community reaction at smaller airports may differ from that at larger airports; survey techniques are capable of identifying changes in annoyance associated with numerically small changes in noise exposure; changes in the prevalence of annoyance are causally produced by changes in noise exposure; and changes in annoyance associated with changes in exposure vary with time

89. **Fidell,S, Howe,B, Tabachnick,B, Pearson,K, and Sneddon,M.** Noise-induced sleep disturbances in residences near two civil airports. NASA1-20101 Contract. 1995. NASA Langley Research Center.
Ref Type: Report
Ref ID: 533

90. **Fidell,S, Pearsons,K, Tabachnick,B, Howe,R, Silvati,L, Barber,DS** (1995): Field study of noise-induced sleep disturbance. *J.Acoust.Soc.Am.* 98: 1025-1033.
Ref ID: 184

Abstract: Behaviorally confirmed awakenings were recorded during nighttime hours for periods of approximately one month in 45 homes of 82 test participants. Measurements of awakening and of both indoor and outdoor noise exposure were made for a total of 632 subject nights near a military airfield, 783 subject nights near a civil airport, and 472 subject nights in neighborhoods with community noise exposure of nonaircraft origin. Sound exposure levels of individual noise intrusions were much more closely associated with awakenings than long-term noise exposure levels. The slope of the relationship between awakening and sound exposure level was rather shallow, however. Although the present findings do not resemble those of laboratory studies of noise-induced sleep interference, they are in good agreement with the results of other field studies

91. **Fidell,S, Schultz,TJ, Green,DM** (1988): A theoretical interpretation of the prevalence rate of noise-induced annoyance in residential populations. *J.Acoust.Soc.Am.* 84: 2109-2113.
Ref ID: 376

Abstract: A simple statistical model containing only one free parameter is proposed to account for the variability observed in a dosage-effect relationship between an integrated metric of noise exposure and the prevalence of annoyance in a community as synthesized by Schultz (*J.Acoust.Soc.Am.* **64**, 377-405, 1978). The model assumes that the community's noise dose is produced by long-term noise exposure acting through a compressive transformation of the day-night average sound level (DNL). Individual reactions to this dose are characterized by a random variable. Individuals are assumed to report a consequential degree of annoyance when the value of this random variable exceeds a criterion level that is not a function of acoustic factors.

92. **Fidell,S, Silvati,L** (1991): An assessment of the effect of residential acoustic insulation on prevalence of annoyance in an airport community. *J.Acoust.Soc.Am.* 1991; 89: 244-247.
Ref ID: 229
93. **Fidell,S, Silvati,L, Howe,R, Pearsons,KS, Tabachnick,B, Knopf,RC et al** (1996): Effects of aircraft overflights on wilderness recreationists. *J.Acoust.Soc.Am.* 100: 2909-2918.
Ref ID: 70
Abstract: On-site and telephone opinion surveys were conducted to assess outdoor recreationists' annoyance with aircraft overflights of wilderness areas. Although current technology for measuring noise exposure does not yet permit accurate and cost-effective estimates of dosage-response relationships in outdoor recreational settings, it was nonetheless possible to construct a rough relationship between estimated aircraft noise exposure and annoyance from the data of the on-site study. In the second survey, telephone interviews were administered to another sample of outdoor recreationists within 2 weeks of their return from visits to 12 wilderness areas. The prevalence of aircraft noise-induced annoyance (in any degree) among respondents in all wilderness areas ranged from 5% to 32%. The prevalence of a consequential degree of aircraft noise-induced annoyance among respondents was less than 5% in all wilderness areas combined. Noise-induced annoyance proved to be a more direct measure of the effects of aircraft overflights on recreationists than more global measures such as visit satisfaction or intent to revisit
94. **Fields,JM** (1984): The effect of numbers of noise events on people's reactions to noise: an analysis of existing survey data. *J.Acoust.Soc.Am.* 75: 447-467.
Ref ID: 44
Abstract: The effect of the number of noise events on noise annoyance has been examined in an analysis of data from large-scale social surveys. The relative impact of noise level and number on human reactions is measured by the decibel equivalent number effect (k) expressed as the number of decibels which have an effect equivalent to that of a tenfold increase in number of events. Values of k differ between surveys but none is significantly greater (p greater than 0.05) than the value of k = 10 which is implicit in Leq or Ldn. The mean of the existing data provide a best estimate of k = 5. Although there are some surveys in which annoyance decreases as numbers of events increase above about 150 a day, the available evidence is not strong enough to reject the conventional assumption that reactions are related to the logarithm of the number of events. The conventional assumption that the effects of number and peak noise level are additive cannot be rejected with these data. Differences between the surveys' estimates of the effect of number of events remained large even when equivalent questionnaire items and definitions of noise events could be used. The most likely explanations for inconsistent estimates are (1) errors in specifying the values of noise parameters, (2) the effects of unmeasured acoustical and area characteristics which are correlated with noise level or number, and (3) large sampling errors which are due to community differences in response to noise. Multipoint annoyance scales give more reliable estimates than do dichotomous "very annoyed" measures. It is concluded that significant improvements in the knowledge about the effects of numbers of noise events will only occur if surveys include large numbers of study areas, a requirement which can only be met if economical noise measurement techniques are developed which have known levels of precision
95. **Fields,JM.** An evaluation of study design for estimating a time-of-day noise weighting. Bionetics Corp. (ed). NASA-CR-178062, 1-30. 1986. Hampton,VA,USA.
Ref Type: Report
Ref ID: 391
96. **Fields,JM.** The relative effect of noise at different times of day: an analysis of existing survey data. Bionetics Corp. (ed). NASA-CR-3965. 1986. Hampton VA, USA, NASA.
Ref Type: Report
Ref ID: 392
97. **Fields,JM** (1990): A quantitative summary of non-acoustical variables' effects on reactions to environmental noise. In Busch-Vishniac,I, editor. *National Conference on Noise Control*

Engineering: Reducing the Annoyance of Noise. Austin: University Texas.
Ref ID: 98

98. **Fields, JM**. Effects of personal and situational variables on noise annoyance with special implications for en route noise. Federal Aviation Administration and NASA Report (ed). FAA-AEE-92-03. 1992. Washington DC.
Ref Type: Report
Ref ID: 419
99. **Fields, JM**. A review of an updated synthesis of noise /annoyance relationships. National Aeronautics and Space Administration. Langley Research Center (ed). NASA contractor report CR 1944950. 1994.
Ref Type: Report
Ref ID: 420
100. **Fields, JM** (1998): Reactions to environmental noise in an ambient noise context in residential areas. *J. Acoust. Soc. Am.* 104: 2245-2260.
Ref ID: 166

Abstract: Direct reanalyses of over 57 000 interview responses to 35 noise sources in 20 social surveys and reviews of publications for over 12 000 additional responses to 16 noise sources in 13 social surveys show that residents' reactions to an audible environmental noise (a target noise) are only slightly or not at all reduced by the presence of another noise source (ambient noise) in residential environments. The direct reanalyses account for type of noise source (aircraft, road traffic, railway, impulse noise), type of noise reaction question, type of activity disturbance, quality of noise data, type of regression analysis model (linear, logit, probit), two noise metrics (DNL, L(Aeq)), and ten personal characteristics. Although there is considerable variation from survey to survey, the best direct estimate is that approximately a 20-dB increase in ambient noise exposure (95% confidence interval of 15-50 dB) has no more impact than approximately a 1-dB decrease in target noise exposure. Tabulations of 12 findings from laboratory studies in which subjects rated periods of multiple noise events also found that target noise annoyance is not consistently reduced by ambient noise
101. **Fields, JM and Powell, CA**. A community survey of helicopter noise annoyance conducted under controlled noise exposure conditions. NASA Langley Research Center (ed). NASA-TM-86400, 1-188. 1985. Hampton, VA, USA.
Ref Type: Report
Ref ID: 390
102. **Fields, JM, Walker, JG** (1982): Comparing the relationship between noise level and annoyance in different surveys. A railway noise vs. aircraft and road traffic comparison. *J. Sound Vib.* 81: 51-81.
Ref ID: 421
103. **Finegold, LS** (1993): Current status of sleep disturbance research and development of criterion for aircraft noise exposure. *J Acoust Soc Am* 94: 1807-
Ref ID: 531
104. **Firle, TE**. Ldn dictates local options - why? Proceedings of the International Conference on Noise Control Engineering, Cambridge, MA. Federal (Aviation Administration, Washington DC US (ed). 2, 973-978. 1986. Cambridge, MA.
Ref Type: Conference Proceeding
Ref ID: 393
105. **Fisher, LD, Tucker, DC** (1991): Air jet noise exposure rapidly increases blood pressure in young borderline hypertensive rats. *J. HYPERTENS.* 1991; 9: 275-282.
Ref ID: 193

Abstract: The present study tested the hypothesis that air jet noise exposure elicits sympathetically-mediated increases in the blood pressure of weaning-aged borderline hypertensive rats (BHR). BHR were the F-1 offspring of spontaneously hypertensive female rats and male Wistar-Kyoto rats. Beginning at weaning (4 weeks of age), restrained BHR

were exposed to air jet noise (30-120 s pulses of 120 dB) for 2 h/day, 5 days per week. Controls were restrained but did not receive air jet noise exposure. After only 1 week of air jet exposure, the systolic blood pressure (SBP) levels of the noise-exposed rats were increased significantly above those of restrained controls. Measures of mean arterial pressure (MAP) made in the home cage after 2 weeks of noise exposure confirmed the increased SBP. Ten weeks of air jet noise exposure increased MAP compared with restrained controls (144 ± 4 versus 128 ± 4 mmHg), with both SBP and diastolic blood pressure (DBP) being significantly increased. Baroreceptor sensitivity, assessed by bradycardic responses to graded doses of phenylephrine (0.5, 1, 2 and 4 μ g/kg, intravenously), did not differ from restrained controls after 10 weeks of noise exposure. Autonomic (largely sympathetic) influence on home-cage blood pressure, inferred from ganglion blockade with chlorisondamine, also did not differ between groups after 10 weeks of stress. After maximal vasodilation with hydralazine, the DBP or air jet noise-exposed rats was somewhat higher than restrained controls (62 ± 5 versus 49 ± 3 mmHg; $P = 0.08$), suggesting that structural changes may have contributed to the increased MAP in air jet noise-exposed rats. In summary, exposure of weanling BHR rats to chronic air jet noise increased blood pressure within 1 week and pressure remained elevated during 10 weeks of stress. While autonomic mechanisms were not found to mediate the higher home-cage blood pressure observed in air jet noise-exposed BHR, structural changes in the vasculature may have contributed

106. **Folch,H, Ojeda,F, Esquivel,P** (1991): Rise in thymocyte number and thymulin serum level induced by noise. *Immunol.Lett.* 30: 301-305.

Ref ID: 523

Abstract: A high level of noise is known to induce important changes in the immune system. In this work, the effect of sound stress on the circulating level of thymulin and on the cellularity of the thymus gland was studied. The experiments were done in RK mice exposed to a noise level of 100 dB for a period of 1 h. Following the noise exposure, the animals were bled at different times for thymulin titration, or killed in order to evaluate the number of cells and the weight of each thymus. The results indicate that young mice exposed to the stressor stimulus show an increase in serum thymulin titre, and at the same time they show an increment in thymus weight and in thymocyte number compared to control. These results support a new argument in favour of the theory of a central nervous system control on the thymus function

107. **Frair,L** (1984): Airport noise modelling and aircraft scheduling so as to minimize community annoyance. *Applied Mathematical Modelling* 8: 271-281.

Ref ID: 394

108. **Franssen,EA, de Jong,RG, Miedema,HM, Vos,H, Walda,IC, and Wiechen,CM.** Annoyance, sleep disturbances, health aspects, perceived risk and residential satisfaction around Schiphol airport: Results of a questionnaire survey; Summary. RIVM Report Nr:441520011, TNO Report Nr. 98.052. 1999. Bilthoven, Netherlands, RIVM, National Institute of Public Health and Environment.

Ref Type: Report

Ref ID: 442

Abstract: This summary describes the results of one part of the research programme the 'Health impact Assessment Schiphol Airport, which is a questionnaire based survey on annoyance, sleep disturbance, self rated health, risk perception and residential satisfaction around Schiphol Airport of the study were:

- . to assess the prevalence of the above mentioned parameters
 - . to study the relationships between annoyance and changes in the parameters
 - . to study the correlation between noise exposure level and changes in the parameters
- Short communication!

109. **Franssen,EA and Lebret,E.** Variatie in geboortegewicht in de omgeving Schiphol. RIVM Report Nr. 441520008. 1997. RIVM Institute of Public Health and Environmental Protection.
Ref Type: Report
Ref ID: 444
- Abstract: Within the framework of the Health Impact assessment Schiphol Airport variations in birth weight and prenatal growth was studied. The study was motivated by a literature review that was conducted in 1993. Individual data on birth weight and prenatal growth of singletons from the Dutch Obstetrics Registration were combined with aggregated data on aircraft noise exposure and socio-economical status.
Regression analyses showed no statistical significant association between birth weight or prenatal growth and aircraft noise exposure. The results were adjusted for several parameters. The data showed no indications for a threshold or nonlinear exposure-response relation. Because of several limitations in the study it cannot be excluded that an effect of aircraft noise could be masked by not controlled variables (smoking behaviour of mothers).
(Results contrary to Knipschild
110. 111.
Franssen,EA, Staatsen,BA, Vrijkotte,TG, Lebret,E, and Passchier-Vermeer,W. Noise and Public Health; Workshop Report. 441520004. 1995. Bilthoven,the Netherladns, RIVM, National Institute for Public Health and Environmental Protection.
Ref Type: Report
Ref ID: 441
- Abstract: Konzept für eine Studie zum Fluglärm im Hinblick auf einen Ausbau von Shiphol unter Berücksichtigung der Literatur. Schwerpunkte: Schlaf, Kognitive Fähigkeiten von Kindern, survey
112. **Frustorfer,B, Pritsch,MG, Ott,P, Sturm,G** (1988): Effects of daytime noise load on the sleep wake cycle and endocrine patterns in man: II. 24 hours secretion of anterior and posterior pituitary hormones and of cortisol. *Int J Neurosci* 39: 211-221.
Ref ID: 543
113. **Frustorfer,B, Pritsch,MG, Pritsch,MB, Clement,HW, Wesemann,W** (1988): Effects of daytime noise load on the sleep wake cycle and endocrine patterns in man: III. 24 hours secretion of free and sulfate conjugated catecholamines. *Int J Neurosci* 43: 53-62.
Ref ID: 540
114. **Garbell,MA.** Research goals for identification and substantiation of a rational aircraft-noise descriptor system relevant to human annoyance by aircraft noise. 1, 691-694. 1989. Pougheepsie,NY, Noise Control Foundation.
Ref Type: Conference Proceeding
Ref ID: 395
115. **Gehrig,W, Meyer,P, Ising,H, Kuhl,KD, Schmidt,R, Grutzmacher,W** (1993): The influence of military low-altitude flight noise on the inner ear of the guinea pig. Part I: Hearing threshold measurements. *Schriftenr. Ver. Wasser.Boden.Lufthyg.* 88: 368-378.
Ref ID: 134
- Abstract: The auditory thresholds of about 60 anaesthetized guinea pigs were determined at 3 or 4 frequencies between 2 and 20 kHz using the acoustically evoked brain stem potentials. The animals were then exposed to electro-acoustically reproduced MLAF noise with peak levels between 120 and 130 dB(A). The exposure occurred either once or else four times within either 3 or 60 minutes. The level of noise increased at 7.5 and 75 dB/s (slow and fast increase). TTS was then determined. PTS was measured one week later. In over half the animals, exposure to rapidly increasing noise level with a peak of 126 dB(A) induced PTS > or = 30 dB for at least one frequency. Exposure to a slowly increasing noise level with the same peak provoked significantly smaller PTS. 4 exposures to a rapidly rising noise level within 3 minutes induced significantly smaller PTS than the same dosage within 60 minutes. Only in the latter case was PTS greater than TTS
116. **Gezondheidsraad: Commissie Vliegtuiglawaai en slaap.** Vliegtuiglawaai en slaap. 1991/05. 1999. Den Haag, Gezondheidsraad, Den Haag.

Ref Type: Report
Ref ID: 554

117. **Gierke,HE, Harris,CS** (1987): Annoyance to military flight operations and the development of standard criteria for community annoyance. *Dev Toxicol Environ Sci* 15: 257-269.
Ref ID: 464

118. **Gjestland,T.** Aircraft noise annoyance. Proceedings of the Int.Conference on Noise Control Engineering, Newport Beach,CA. 2, 903-908. 1989. Poughkeepsie, NY, Noise Control Foundation.
Ref Type: Conference Proceeding
Ref ID: 396

119. **Gomes,LM, Martinho Pimenta,AJ, Castelo Branco,NA** (1999): Effects of occupational exposure to low frequency noise on cognition. *Aviat.Space.Environ.Med.* 70: A115-8.
Ref ID: 24

Abstract: Previous studies performed on groups of workers employed in the aeronautical industry revealed morphological vascular changes of the central nervous system (CNS) and some difficulty in attention and memory retention. The goal of this study is, therefore, to determine whether prolonged occupational exposure to large pressure amplitude (> or = 90 dB SPL) and low frequency (< or = 500 Hz) (LPALF) noise leads to cognitive deterioration. METHODS: We observed 40 male workers employed as aircraft technicians, with average age of 43.3 yr (range 35-56, SD = 4.82) occupationally exposed to LPALF noise for a long period of time, average 22 yr (range 13-30, SD = 4.90), and 30 educationally- and age-matched male controls. None of the subjects had a history of alcoholism, and all were drug-free. The P300 event-related brain potential elicited with an auditory discrimination task was recorded and psychological tests (the Wechsler memory scale and the Toulouse-Pieron test) were performed. RESULTS: The P300 latency was significantly longer (328.5 vs. 307.5 ms, $F = 11.7$, deg. signif.=0.001) and the amplitude significantly smaller (10.9 vs. 12.6, $F = 4.3$, deg. signif.=0.04) in the exposed group than in the controls. No significant differences were found in the results of the Toulouse- Pieron test. The different subscales of the Wechsler memory scale did not show any significant difference except in the immediate verbal memory, where the exposed workers were found to have poorer results than the controls (10.0 vs. 11.3, $F = 5.6$, deg. signif.=0.02). However, the memory quotient obtained from the Wechsler memory scale indicated a significant difference between both groups (101.8 vs. 108.3, $F = 10.1$, deg. signif.=0.002); exposed subjects presented lower results. CONCLUSION: These findings suggest that prolonged exposure to LPALF noise might contribute to cognitive impairment and that the P300 event- related brain potential recording may be a valuable diagnostic tool

120. **Grebner,S, Meloni,T, Krueger,H** (1995a): Annoyance from aircraft noise. *Z.Lämbekämpf.* 1995; 42: 36-41.
Ref ID: 224

Abstract: In a laboratory study about combined effects of aircraft noise and road traffic noise three groups of individuals which have different amounts of noise aircraft and road traffic noise in their residential areas were investigated in respect to their subjective annoyance. The study shows that the degree of 'Hervorgehobenheit' (dominance) of the aircraft noise over the background noise (road traffic) has no significant influence on the proportion of the considerably annoyed individuals. 'Hervorgehobenheit' (dominance) is defined as the difference between the peak level of the aircraft noise and the energy equivalent sound level of the road traffic noise. A binaural recording technique, equivalent to human ears, using an artificial head and subsequent replay in the laboratory of the combined acoustic stimuli from aircraft and traffic noise, does not account for more of the variance in subjective annoyance ratings of the aircraft noise over the background traffic noise than the usual monaural exposure. The different experience of the individuals with the combined effects of aircraft and traffic noise in their residential area has no influence upon the annoyance ratings of aircraft noise in the laboratory

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121. **Grebner,S, Meloni,T, Krueger,H** (1995b): Laestigkeit von Flugverkehrsgeraueschen Annoyance with aircraft noise. *Zeitschrift fuer Laermbekaempfung* 42: 36-41.
Ref ID: 325
Abstract: German ABG: In einer Laborstudie zur Kombinationsbelastung durch Flug- und Strassenverkehrsgerauesche wurden insgesamt 47 Versuchspersonen, die aus drei unterschiedlich stark mit Flug- und Strassenverkehrsgeraueschen belasteten Wohngebieten stammten, bezueglich ihrer subjektiv empfundenen Laestigkeit untersucht. Es zeigte sich, dass das Ausmass der Hervorgehobenheit der Flugverkehrsgerauesche vor dem Hintergrundgerauesch Strassenverkehr keinen signifikanten Einfluss auf den Anteil der stark durch die Flugverkehrsgerauesche gestoerten Personen hatte. Eine binaurale Kunstkopfaufnahmetechnik und die damit gehoerrichtige Wiedergabe der akustischen Reizkombination aus Flug- und Strassenverkehrsgeraueschen im Labor erklarte im Gegensatz zur herkoemmlichen monauralen Darbietung nicht mehr Varianz der Laestigkeit des Flugverkehrsgeraueschs vor dem Hintergrundgerauesch Strassenverkehr. Die unterschiedliche Erfahrung der Versuchspersonen mit der Kombinationsbelastung durch Flug- und Strassenverkehrsgerauesche in ihrem Wohngebiet hatte keinen signifikanten Einfluss auf die Laestigkeit des Flugverkehrsgeraueschs im Labor. (Zeitschrift/Angelika Zimmer - ZPID)
experience with noise & combined effects of aircraft noise & road traffic noise on annoyance; binaural artificial head measurement; 47 subjects; experimental study
122. **Green,DM, Fidell,S** (1991): Variability in the criterion for reporting annoyance in community noise surveys. *J.Acoust.Soc.Am.* 89: 234-243.
Ref ID: 230
123. **Green,KB, Pasternack,BS, Shore,RE** (1982): Effects of aircraft noise on reading ability of school aged children. *Arch Environ Health* 37: 24-31.
Ref ID: 492
124. **Griefahn,B.** Research on noise and sleep: present state. Proceedings of the 5th International Congress on noise as a public health problem. Berglund, B. and Lindvall, T (eds). 5, 17-20. 1990. Stockholm, Sweden, Swedish Council for Building Research.
Ref Type: Conference Proceeding
Ref ID: 557
125. **Griefahn,B.** Effects of military noise during sleep. Relations to sex and time of night. Proceedings of the 5th International Congress on noise as a public health problem. Berglund, B. and Lindvall, T. (eds). 39-45. 1990. Stockholm, Sweden, Swedish Council for Building Research.
Ref Type: Conference Proceeding
Ref ID: 558
126. **Griefahn,B** (1990c): Präventivmedizinische Vorschläge für den nächtlichen Schallschutz. *Z.Lärmbekämpfung* 37: 4-14.
Ref ID: 562
127. **Griefahn,B** (1990d): Research on noise and sleep: present state. In Berglund,B, Lindvall,T, editors. *Noise as a public health problem*. Stockholm: Swedish Council for Building Research.
Ref ID: 101
128. **Griefhan,B** (1990): Research on noise and sleep: Present state. In Berglund,B, Lindvall,T, editors. *Noise as a public health problem Vol5*.
Ref ID: 535
129. **Griefhan,B, Gros,E** (1986): Noise and sleep at home, a field study on primary and after effects. *J.Sound Vib.* 105: 373-383.
Ref ID: 373
130. **Gruber,J.** Sleep disturbance by aircraft noise: changes in sleep stages and increased catecholamine secretion. KNMG-Nachtvluchten en slaapverstoring; Symposium 1992. 1992.

- Rotterdam:KNMG.
Ref Type: Report
Ref ID: 547
131. **Gunn,WJ** (1987): The importance of the measurement of annoyance in prediction of effects of aircraft noise on the health and well-being of noise- exposed communities. *Dev.Toxicol.Environ.Sci.* 15: 237-256.
Ref ID: 52
132. **Gunter,TC, van-der-Zande,RD, Wiethoff,M, Mulder,G, Mulder,LJ** (1999): Visual selective attention during meaningful noise after sleep deprivation. *Electroencephalograph clin Neurophysiol-Suppl* 40: 99-107.
Ref ID: 462
133. **Guski,R** (1987): *Lärm: Wirkungen unerwünschter Geräusche* . Bern: Huber.
Ref ID: 600
134. **Guski,R** (1995): Psychische Auswirkungen von Umweltlärm - aktuelle Fragen. *Bundesgesundheitsblatt* 38: 89-94.
Ref ID: 591
135. **Guski,R, Felscher-Suhr,U** (1999): The concept of noise annoyance: How international experts see it. *J Sound Vibr* 223: 513-527.
Ref ID: 453

Abstract: The first part of the paper discusses some definitions of noise annoyance. The second part is a report on an empirical study in which 68 noise research experts from seven different nations were asked to indicate 1) the main noise effects 2) to rate the similarity between the concept "noise annoyance and several related concepts 3) the two aspects rated highest in similarity to annoyance and disturbance 4) although noise annoyance must be related to acoustic variables, acoustic characteristics do not play an overwhelming role in the concept of annoyance. Although most experts agree about the main components of the annoyance concept there are some differences in weight between countries. If those are due to difference in connotation of related words or due to differences in concepts could not be analyzed.
136. **HACAN and Holland,W.** Health effects of aircraft noise. 1997. HACAN.
Ref Type: Report
Ref ID: 454
137. **Hall,FL** (1984): Community responses to noise: Is all noise the same? *J Acoust Soc Am* 76: 1161-1168.
Ref ID: 439

Abstract: Several papers have been published which compare community responses to different noise sources such as airtraffic, road traffic or railway traffic.Is an average dose/respose curve possible for all sources or are there systematic variations? As there are not sufficient data as to the reasons for the found difference in community responses to different sources it is proposed to use meanwhile a general dose/response curve.
138. **Hartikainen-Sorri,AL, Kirkinen,P, Sorri,M, Anttonen,H, Tuimala,R** (1994): No effect of experimental noise exposure on human pregnancy. *Obstet Gynecol* 1991 77: 611-617.
Ref ID: 498

139. **Hartikainen,AL, Sorri,M, Anttonen,H, Tuimala,R, Laara,E** (1994): Effect of occupational noise on the course and outcome of pregnancy. *Scand J Work Environ Health* 20: 444-450.
Ref ID: 499
- Abstract: OBJECTIVES--The goal of this investigation was to examine the effects of occupational noise during pregnancy prospectively. METHODS--The exposed group [continuous A-weighted sound level (LAeq(8 h)) > or = 78 dB] consisted of 111 pregnant women, and the reference group comprised 181 pregnant women with approximately similar work conditions but without noise exposure. The noise-exposed women had more frequently other inconveniences in their work, however, like shift work, impulse noise exposure, vibration, and a high or low temperature. RESULTS--With the limit of 78 dB (LAeq (8 h)), the course and outcome of pregnancy did not differ between the groups. When the noise exposure was 90 dB (LAeq (8 h)) or more, a decline in birthweight, either absolute for the exposed versus unexposed or related to the gestational age (below the 10th percentile [5 of 25 (20%) versus 13 of 180 (7%)]), was seen. These findings were more pronounced if the woman was simultaneously exposed to a standing work position or shift work. CONCLUSIONS--Working in high noise exposure can be considered a form of risk during pregnancy.
140. **Hellman,RP** (1984): Growth rate of loudness, annoyance and noisiness as a function of tone location within the noise spectrum. *J.Acoust.Soc.Am.* 75: 209-218.
Ref ID: 397
141. **Herbold,M, Hense,HW, Keil,U** (1989): Effects of road traffic noise on prevalence of hypertension in man: results of the Luebeck Blood Pressure Study. *Soz Präventivmed* 34: 19-23.
Ref ID: 586
142. **Hofman,W.** Vliegtuiglawaai,slaap en gezondheid. Eenliteratuurstudie. A91/01. 1991. Den Haag: Gezondheidsraad.
Ref Type: Report
Ref ID: 548
143. **Hofman,W, Kumar,A, and Eberhardt,J.** Comparative evaluation of sleep disturbance due to noise from airplanes, trains and trucks: Proceedings of the 6th International Conference on Noise as a Public Health Problem. Vallet, M. (ed). 2, 559-562. 1993. Arcueil, Cedex, France, INRETS.
Ref Type: Conference Proceeding
Ref ID: 565
144. **Horne,JA, Pankhurst,FL, Reyner,LA, Hume,K, Diamond,ID** (1994): A field study of sleep disturbance: effects of aircraft noise and other factors on 5,742 nights of actimetrically monitored sleep in a large subject sample. *Sleep.* 17: 146-159.
Ref ID: 62
- Abstract: This field study assessed the effects of nighttime aircraft noise on actimetrically measured sleep in 400 people (211 women and 189 men; 20-70 years of age; one per household) habitually living at eight sites adjacent to four U.K. airports, with different levels of night flying. Subjects wore wrist-actimeters for 15 nights and completed morning sleep logs. A sample of 178 nights of sleep electroencephalograms (EEGs) were recorded synchronously with actigrams. The EEG was used to develop filters for the raw actigrams, in order to: (1) estimate sleep onset and (2) compare actigrams with aircraft noise events (ANEs). Actigrams, filtered to detect the onset of discrete movements, were able to detect 88% of all EEG-determined periods of interim wakefulness of > 15 seconds and periods of movement time of > 10 seconds. The main findings were: (1) actimetry and self-reports showed that only a minority of ANEs affected sleep, and, for most of our subjects, that domestic and idiosyncratic factors had much greater effects; (2) despite large between-site variations in ANEs, the difference between sites in overall sleep disturbance was not significant; (3) there was a diminished actimetric response to ANEs in the first hour of sleep and, apparently, also in the last hour of sleep; and (4) men had significantly more discrete movements than women and were more likely to respond to ANEs JOURNAL-ARTICLE 1994310304 199410

145. **Horne,JA, Reyner,LA, Pankhurst,FL, Hume,KI** (1995): Patterns of spontaneous and evoked body movements during sleep. *SLEEP* 18: 209-211.
Ref ID: 262
Abstract: Two sleep-related movement periodicities were found in 5,742 pooled actigrams: in spontaneous movements and in movements evoked by aircraft noise. The former appeared to be associated with stage 3 + 4 sleep and the latter with rapid eye movement sleep
146. **Hygge,S** (1993): A comparison between the impact of noise from aircraft, road traffic and trains on long-term recall and recognition of a text in children aged 12-14 years. *Schriftenr. Ver. Wasser. Boden. Lufthyg.* 88: 416-427.
Ref ID: 14
Abstract: A total of 417 students in the seventh grade, 12-14 old, took part in three 15 min learning sessions in their ordinary class- rooms. Their task was to read a text, and they were tested one week later with difficult recall questions and less difficult recognition items on the text. The first session was a pretest for their learning abilities. This session was run in ambient noise conditions and all the students read the very same text. The scores from this session were employed to split the pupils along the median into two groups of learning ability. Sessions two and three were counterbalanced as a noise condition or an ambient noise condition. In these sessions two other texts were employed, and they appeared equally often under the noise and ambient conditions, as well as under the two different presentation orders. Three subgroups of the pupils were exposed to aircraft noise, train noise and road-traffic noise. The noise types were of the same equivalent level (66 dB(A) Leq) in all subgroups. The design of the study permitted two different analyses of long-term learning. First, in a within subject analysis, the difference scores between the noise and ambient noise conditions in session 2 and 3 were calculated, and crossed with learning ability (high and low) and type of noise. In a second between subject analysis, the difference scores in session 1 and 2 were crossed with the group factor whether they had noise or ambient conditions in session 2, and the ability and noise type factors. Both analyses yielded the same results. Noise impaired long-term recall of the difficult items. Degree of impairment on the recall items did not interact with noise source or learning ability. The average impairment due to aircraft and road traffic noise was around 23% of the scores. Train noise had no effect. For the easy recognition items there were no effects of noise exposure, nor of its interaction with noise source and learning ability. Since the number of pages read did not differ between noise and ambient conditions, an explanation in terms of distraction is ruled out. The results are discussed in terms of arousal and cognitive overload
147. **Hygge,S, Evans,GW, and Bullinger,M.** The Munich Airport noise study: Psychological, cognitive, motivational and quality of life effects on children: Proceedings of the 6th International Congress on Noise as a Public Health Problem. Vallet, M. (ed). 3, 301-308. 1993. Arcueil, Cedex, France, INRETS.
Ref Type: Conference Proceeding
Ref ID: 572
148. **Hygge,S, Evans,GW, and Bullinger,M.** The Munich airport noise study: Psychological, cognitive, motivational and quality of life effects on children. Vallet, M. (ed). 1, 37-37. 1993. Cedex, France: INRETS Actes Nr.34. 1993.
Ref Type: Conference Proceeding
Ref ID: 370
149. **Idzior-Walus,B** (1987): Coronary risk factors in men occupationally exposed to vibration and noise. *Eur Heart J* 8: 1040-1046.
Ref ID: 597
150. **Irwin,MR, Segal,DS, Hauger,RL, Smith,TL** (1989): Individual behavioral and neuroendocrine differencec in responsiveness to audiogenic stress. *Pharmacology Biochemistry and Behavior* 32: 913-917.
Ref ID: 527

151. **Ishi,K, Ising,H, Merker,HJ, Stenzel,R, Wenzel,M** (1993): The influence of military low-altitude flight noise on the inner ear of the guinea pig. Part II: Scanning electron micrographs. *Schriftenr. Ver. Wasser. Boden. Lufthyg.* 88: 379-387.
Ref ID: 95
Abstract: Guinea pigs were exposed once to MLAF noise (126 dB(A), 75 dB/s) and 12 cochleae were prepared for scanning electron microscopy 2 to 3 weeks after exposure. Qualitative analysis of the cilia of the outer hair cells revealed the types of damage already described in literature. The spatial distribution of cilia damage, however, differed essentially from the well known pattern: the damage was more or less pancochlear, beginning in the basal turn and increasing in frequency and severeness of damage till the end of the third turn. The most severe damage was visible in the outer row of the outer hair cells. This special pattern of cilia damage indicates that MLAF noise causes a different type of damage than the types described in literature. More studies are needed
152. **Ising,H, Babisch,W, Günther,T, Kruppa,B** (1997): Risikoerhöhung für Herzinfarkt durch chronischen Lärmstress. *Z.Lärmbekämpfung* 44: 1-7.
Ref ID: 595
153. **Ising,H, Curio,I, Otten,H, Rebentisch,E, and Schulte,W.** Gesundheitliche Wirkungen des Tieffluglärms - Hauptstudie. 91-10501116. 1991. Berlin, Umweltforschungsplan des Bundesministeriums für Umwelt, Naturschutz und Reaktorsicherheit.
Ref Type: Report
Ref ID: 592
154. **Ising,H and Michalak,R.** Effects of noise from military low-level flights on humans:part2, Proceedings of the 5th International Congress on Noise as a Public Health Problem. Berglund, B. and Lindvall, T. (eds). 305-313. 1990. Stockholm, Swedish Council for Building Research.
Ref Type: Conference Proceeding
Ref ID: 607
155. **Ising,H, Rebentisch,E** (1992): Gesundheitliche Wirkungen des Tieffluglärms (Kurzfassung). *Z.Lärmbekämpfung* 39: 52-54.
Ref ID: 611
156. **Ising,H and Rebentisch,E.** Comparison of acute reactions and long-term extra-aural effects of occupational and environmental noise exposure; Proceedings of the 6th International Congress on Noise a a Public Health Problem. Vallet, M. (ed). 3, 280-287. 1993. Arcueil, Cedex, France, INRETS.
Ref Type: Conference Proceeding
Ref ID: 587
157. **Ising,H, Rebentisch,E** (1993b): Results of a low-altitude flight noise study in Germany: aural effects. *Schriftenr. Ver. Wasser. Boden. Lufthyg.* 88: 339-367.
Ref ID: 64
158. **Ising,H, Rebentisch,E, Babisch,W, Curio,I, Sharp-Baumgartner,DH** (1990): Medically relevant effects of noise from military low-altitude flights. Results of an interdisciplinary pilot study. *ENVIRON.INT.* 1990; 16: 411-423.
Ref ID: 200
Abstract: Laboratory experiments and field measurements were carried out to determine relevant acute and long term effects of noise from low-flying military aircraft. Acute effects on the cardiovascular system were established under simulation conditions. Blood pressure, heart rate, and biochemical stress parameters (cortisol and catecholamines, renin and free fatty acids in blood) were measured as a function of time. Long-term effects of noise from low- flying aircraft were analyzed in 10 to 13-year-old children by comparative studies including a 75 m low-altitude flight area and a neighbouring area with flight altitudes of 150 - 450 m. Significantly higher blood pressure values were found in girls in the 75 m area. The hearing thresholds were significantly increased in boys and girls in the 75 m area. Altogether, acute effects of noise from low-flying aircraft on cardiovascular functions and hearing ability

could be proved, and potential risks of long-term exposure to low-altitude flight noise are discussed

159. **Ising,H, Rebentisch,E, Poustka,F, Curio,I** (1990): Annoyance and health risk caused by military low-altitude flight noise. *Int.Arch.Occup.Environ.Health* 62: 357-363.

Ref ID: 51

Abstract: Effects of noise of low-flying military jet aircraft were investigated from demoscopic and epidemiological points of view. Areas with different low-altitude flight noise exposure were compared with one another as to subjective annoyance, casual blood pressure and ear symptoms. With the same energy equivalent sound pressure level (Leq), the subjective disturbance caused by military low-altitude flight noise was essentially greater than that due to ordinary flight noise (in the neighbourhood of civil airports). A comparison of several areas revealed that frequencies of ear symptoms (tinnitus lasting more than one hour and permanent hearing threshold shifts of greater than 30 dB) were higher only in areas where maximal flight noise levels considerably exceeded 115 dB (A) accompanied by rapid noise level increases. Blood pressure measurements yielded significantly higher values (group difference 9 mm Hg systolic) in girls living in these highly exposed areas. Acoustic limits are proposed with respect to public health

160. 161. 162

Jansen,G, Linnemeier,A, Nitzsche,M (1995): Methodenkritische Ueberlegungen und Empfehlungen zur Bewertung von Nachtfluglaerm Methodological considerations and recommendations for the evaluation of nighttime aircraft noise. *Zeitschrift fuer Laermbekaempfung* 42: 91-106.

Ref ID: 326

Abstract: German ABG: Die Studie diskutiert empirische Ergebnisse zu den Auswirkungen von Laerm auf den natuerlichen Nachtschlaf des Menschen. Es wird betont, dass naechtliche Laermbelastungen im wesentlichen nicht durch den Mittelungspegel erfasst und beurteilt werden koennen, sondern dass entscheidend die Maximalpegel heranzuziehen sind. Als weitere Kriterien werden die Zeitstruktur und der Informationsgehalt der Geraeusche genannt. Die diskutierten Beurteilungen gelten fuer "gewohnte" Geraeusche, nicht dagegen fuer hoch informationshaltigen Laerm. Es wird darauf hingewiesen, dass beim gegenwaertigen Stand der Erkenntnisse sich keine anderen als die bisher vorgenommenen Beurteilungen im Rahmen der Bestimmung von Gesundheitsgefaehrungen verantworten lassen. Hiernach wird die Aufweckschwelle bei einem Schallreiz von 60 dB (A) (Maximalpegel) als ein Eckwert fuer die Beurteilung empfohlen, wobei sechs Laermereignisse und weniger in der Nacht unterhalb dieser Weckschwelle noch als zumutbar anzusehen sind. Fuer Aussenpegel wird als Kriterium sechs mal 75 dB (A) vorgeschlagen, wodurch laermbedingtes Aufwachen verhindert werden soll.

aircraft noise & sleep disturbance; relevance of maximum levels & frequency of noise events; critical evaluation of empirical studies; overview

163. **Job,RFS** (1996): The influence of subjective reactions to noise on health effects of the noise. *Environment International* 22: 93-104.

Ref ID: 380

Abstract: Although not definitely established, a causal link between noise exposure in the residential setting and detrimental health effects is suggested by evidence. Health effects of noise may arise as a direct consequence of exposure to noise and may be mediated by reactions to noise such as annoyance and dissatisfaction. The evidence suggests that negative subjective reactions to noise predict health outcomes over and above the prediction available from noise exposure itself. The roles of psychological variables in relation to noise are poorly understood. The present paper outlines a model of potential psychological factors and their possible causal roles in the production of health effects. Relevant research identifies a correlational link between reaction to noise and health sequelae. However, it is difficult to determine whether these relationships arises from annoyance causing health effects, or knowledge of health effects increasing reaction, or some third factor such as noise sensitivity causing conjoint increases in both outcomes. Research to determine the underlying mechanisms of these inter-relationships is recommended.

164. **Job,RFS**. Noise sensitivity as a factor influencing human reaction to noise. *Noise and Health* 3, 57-68. 1999.
Ref Type: Journal (Full)
Ref ID: 47
- Abstract: Reaction (annoyance, dissatisfaction) to noise is itself an important health effect, as well as possibly contributing to other putative health effects of noise. Thus factors such as noise sensitivity, which influences reaction, are of considerable importance. However, noise sensitivity is rarely clearly defined. This paper offers a formal definition of noise sensitivity, and reviews evidence relating to it. Noise sensitivity has been measured in various ways, but may be measured most directly by assessing the reaction to many noise situations (other than involving the noise source(s) which are the focus of the particular study). When noise sensitivity is measured in this way, factor analysis consistently reveals that noise sensitivity is not a unitary concept. Rather two distinct factors appear: one related to loud noise (road traffic, lawn mower), and the other related to quieter noise situations which are nonetheless distracting (rustling papers at the movies, people talking while watching television). More research is needed to address the relationship between these factors, reaction and other health effects.
165. **Job,RFS** (1988): Community response to noise: A review of factors influencing the relationship between noise exposure and reaction. *J.Acoust.Soc.Am.* 83: 991-1001.
Ref ID: 378
- Abstract: Social surveys of the relationship between noise exposure and the subjective reactions to it were reviewed. This review indicated that remarkably similar results have been obtained across different nationalities with different measurement techniques. Only a small percentage (typically less than 20%) of the variation in the individual reaction is accounted for by noise exposure. Analysis of the potential errors in both measurement of noise and reaction suggests that elimination of errors would only slightly increase the observed correlations. Variables such as attitude to the noise source and sensitivity to noise, account for more variation in reaction than does noise exposure. The weaker correlation between noise exposure and attitude than between reaction and attitude suggests that attitude/reaction relationship is not entirely due to noise exposure causing a change in attitude itself. Noise/reaction correlation based on individual data are significantly lower in studies of impulsive noise than non impulsive noise. This may be caused, in part, by the restricted range of noise exposure studied in some socioacoustic investigations of impulsive noise. However, the significantly higher correlations of attitude and reaction in impulsive noise studies suggest that attitude plays even larger part, while noise exposure plays lesser part in determining reaction to impulsive noise relative to non impulsive noise.
166. **Job,RFS** (1993): The role of psychological factors in community reaction to noise. In Vallet,M, editor. *Noise and man 93: Proceedings of the 6th International congress on noise as a public health problem*, 3 ed. Arcueil Cedex, France: INRETS, p Vol 3: 47-79.
Ref ID: 422
167. **Job,RFS, Topple,A, Carter,NL, Peploe,P, Taylor,R, Morrell,S et al** (1996): Test-retest reliability of psychological scales (sensitivity, attitude) related to community reaction to noise. In Hill,FA, Lawrence,R, editors. *Inter-noise 96: Conference Proceedings*, Inter-Noise 96 ed. Liverpool: St. Albans (UK): Institute of Acoustics, pp 2413-2418.
Ref ID: 349
168. **Job,RFS, Topple,A, Hatfield,J, Carter,NL, Peploe,P, Taylor,R** (1996): General scales of community reaction to noise (dissatisfaction and affect) are more stable than scales of annoyance. In Crocker,MJ, Ivanov,NI, editors. *Proceedings of the 4th International Congress on Sound and Vibration*. St. Petersburg, Russia: International Scientific Publications, p Vol 3: 1431-1437.
Ref ID: 425

169. **Job,RFS, Hatfield,J** (1998): Community reaction to noise. *Acoustics Australia* 26: 35-39.
Ref ID: 379
- Abstract: Community reactions to noise is an important effect of noise exposure which may harm health. Amelioration of community reaction requires that it be understood. We offer methodological recommendations in order to improve the validity and reliability of the reaction data upon which the understanding is based. Evidence is presented to indicate the reaction is influenced by features of the person hearing the noise and the situation in which the noise is heard, as well as features of the noise itself. Consistent with this claim, the relation between noise and exposure is found to be stronger when based on group rather than individual data. Given the critical influence of human factors (including psychological variables) on whether the sound is perceived as noise, and on the reaction it produces, we argue that the development of solutions to the noise problem should not be focused exclusively on noise abatement measures. Psychological approaches to overcoming the noise problem, as well as issues for future research are suggested. Aufarbeitung von ca 100 surveys verschiedener Autoren im Hinblick auf Korrelationen zwischen noise exposure and reactions für individual data ($r=.42$) and grouped data ($r=.81$).
170. **Job.R.F.S., Bullen,RB, Burgess,DH** (1991): Noise induced reaction in a work community adjacent to aircraft runways: the Royal Australian Airforce. In Lawrence,A, editor. *Inter-noise 91: The costs of noise: Conference Proceedings*: Noise Control Foundation, Poughkeepsie, N.Y.
Ref ID: 423
171. **Jonckheere,RE** (1989): Evaluation of noise exposure and annoyance around Brussels Airport: Energy descriptor versus exceedance-duration descriptor. *NOISE CONTROL ENG J.* 1989; 32: 93-98.
Ref ID: 202
- Abstract: Aircraft noise immission is currently quantified by a very large number of noise descriptors based on a variety of measurements and algorithms. Such noise descriptors can be classified in two categories: (1) descriptors based on measures of noise energy, such as $L(A_{max})$, $L(eq)$, $L(dn)$, NNI , and (2) descriptors based on a measure of the exceedance duration above a stated threshold level, such as $TA65$ and $TA75$. Some descriptors account for the number of aircraft noise events and/or for daytime and nighttime noise events; others do not. The author evaluates various descriptors of both categories by correlating them with one another and with various social reaction variables derived from opinion surveys in suburban communities clustered about the Brussels International Airport. From its comparison of noise descriptors in terms of the results of the opinion surveys, the present investigation substantiates the conclusion that, generally, descriptors based on noise energy and the number of aircraft operations agree more closely with the annoyance expressed by presumably reasonable people than do exceedance-duration-type noise descriptors
172. **Jones,CJ.** Aircraft noise and sleep disturbance: a field study. KNMG-Nachtvluchten en slaapverstoring; symposium 1992, 13-20. 1992. Rotterdam, The Netherlands, KNMG.
Ref Type: Report
Ref ID: 560
173. **Kalveram,KTh** (1995b): Psychologische Test-Theorie und der Zusammenhang zwischen physikalischer Schallenergie-Dosis und Belästigungswirkung. *Zeitschrift für Lärmbekämpfung* 42: 131-140.
Ref ID: 452
- Abstract: The theory of mental testing and the correlation between physical noise level and annoyance.
Different physical as well as annoyance data were sampled from the same subjects in the vicinity of Munich airport. It turns out that the measurements called L_{eq1} , L_{eq3} , L_s , L_{eq4} , NNI and $FB1$ meet the equivalence criterion of test theory that is they can not be distinguished neither regarding their inter correlations nor their correlation with annoyance. Therefore these measurements may be considered as parallel. Other measures like $D10$, $H81$, $\log N$ and L_{eq10} are not parallel.. However even the forma values are only of moderate validity $=0.5$. Physical noise is only a poor measure when used to predict individual annoyance but it suffices when used to predict group averages.

174. **Kalveram,KTh** (1995c): Psychologische Testtheorie und der Zusammenhang zwischen physikalischer Lärm-Menge und Belästigungswirkung. *Z.Lärmbekämpfung* 42: 131-140.
Ref ID: 603
175. **Kalveram,KTh** (1995a): The theory of mental testing and the correlation between physical noise level and annoyance. *Z.Lärmbekämpfung* 42: 131-140.
Ref ID: 183
- Abstract: The aim of noise research is to predict (psychological) annoyance from (physical) noise measurements. In order to answer the questions, how precise this prediction is, and which of the noise measurement procedures is most suitable, the concepts of 'reliability', 'validity' and 'equivalence' defined in the 'theory of psychological testing' are applied. Thereby, the noise measurements procedures are regarded as 'tests' variables and the related annoyance as the criterion variable. Referring to data of an investigation on aircraft noise in the vicinity of Munich Airport in 1969, in which different physical as well as annoyance data were sampled from the same subjects, it turns out, that the measurements called L_{eq1} , L_s , L_{eq3} , L_{eq4} , NNI and FB1 meet the equivalence criteria of test theory, that is, they cannot statistically be distinguished, neither regarding their intercorrelations nor their correlations with the criterion, and their coefficients of reliability equal their intercorrelation coefficients (both are close to one). Therefore, these six measures can be considered as 'parallel'. Other measurements like D-10, H-81, log N and L_{eq10} , reveal that they are not parallel (in the sense of not equivalent) to the former six. However, even the former are only of moderate validity (about 0.5). In the framework of psychological testing, therefore, physical noise is only a poor measure when used to predict individual annoyance, but it suffices when used to predict group averages. Moreover, it can be concluded that the attempt to enhance validity by modification of the highly reliable physical measuring procedures cannot be successful. It would be more effective to enlarge the reliability of the psychological measurement procedures of annoyance
176. **Kalveram,KTh** (1997): Zur Evolution des Belästigungserlebnisses. Ökopsychologische und verhaltensbiologische Betrachtungen über die Wirkung von Lärm. *Psycholog Beiträge* 38: 215-230.
Ref ID: 604
177. **Kalveram,KTh**. Converting noise level to number: A new method to quantify k-coefficients reveals distance-dependent over- and under-energetic responses around the same airport. Proceedings of the 16th International Congress on Acoustics. 2549-2550. 1998. Seattle,WA,USA.
Ref Type: Conference Proceeding
Ref ID: 449
- Abstract: The paper presents an alternative model utilizing dose-response curves based on regression of annoyance on L_{eq3} referring to different numbers of events. Results are independent from selected annoyance ratings and furthermore also valid for non-linear dose-response curves.
178. **Kalveram,KTh, Drassow,J, and Vogt,J**. How information about the source influences noise annoyance; Proceedings of the 137 Meeting of the Acoustical Society of America. 1999. Berlin, Germany.
Ref Type: Conference Proceeding
Ref ID: 602
179. **Kalveram,KTh, Wiemers,J, and Vogt,J**. Relationship between physical noise level, experienced annoyance and physiological reaction; Proceedings of the 6th International Congress on Sound and Vibration. Jacobsen, F. (ed). 1141-1146. 1999. Technical University of Denmark, Lyngby.
Ref Type: Conference Proceeding
Ref ID: 605

180. **Kay,G, Tarcic,N, Poltyrev,T, Weinstock,M** (1998): Prenatal stress depresses immune function in rats. *Physiol.Behav.* 63: 397-402.
Ref ID: 512
- Abstract: The aim of the present study was to determine the effect of prenatal stress on immune function in rats. Pregnant rats were stressed by noise and light, three times weekly throughout pregnancy. Experiments were performed on male and female offspring aged 2 months. Cellular immune responses of splenic lymphocytes to B-cell (pokeweed mitogen (PWM) and T-cell (phytohemagglutinin (PHA)) mitogens were measured by [3H]thymidine uptake, and natural killer (NK) cell cytotoxicity in blood and splenic lymphocytes was measured against the murine T-cell lymphoma, YAC-1, by a 4-h [51Cr] release assay. Prenatal stress suppressed immune function as shown by a) decreased NK cytotoxicity in splenic and blood lymphocytes, indicating that the effect was not confined to a particular immune compartment, and b) decreased rate of proliferation of splenic lymphocytes to PWM and a smaller depressant effect on their response to PHA. The suppression of B-cell proliferation was more marked in the female and that of NK cell cytotoxicity, in the male. Prenatal stress did not alter the distribution of subsets of lymphocytes, in either the spleen or blood, indicating that the reduction in proliferative and cytotoxic activity resulted from functional modifications of effector mechanisms in the cells rather from alterations in their migration between immune compartments. The mechanisms underlying this effect of prenatal stress are not clear but could result from an action of maternal stress hormones on the developing fetal neuroendocrine system
181. **Kjellberg,A, Skoldstrom,B, Andersson,P, Lindberg,L** (1996): Fatigue effects of noise on aeroplane mechanics. *WORK STRESS.* 1996; 10: 62-71.
Ref ID: 180
- Abstract: Subjective fatigue and reaction time performance were measured in a group of 24 aeroplane mechanics, during 1 week of high noise exposure and 1 week of low noise exposure. Subjective ratings were collected before and after each work day. On the last day of each week subjects also completed a reaction time task before and after work. The mechanics felt more sleepy and less energetic during the high noise week. This effect was most evident towards the end of the day and there was a build-up of the effect during the week. Reaction times were prolonged during the high noise week. Possible confounding factors are discussed and found to be less likely explanations of the effects
182. **Knipschild,P** (1997): Medical effects of aircraft noise: community cardiovascular survey. *Int Arch Occup Environ Health* 40: 185-190.
Ref ID: 465
183. **Komori,M, Miwa,M, Morita,M, Niiya,Y, Hamamatsu,A, Niwa,T et al** (1993): [Relationship between lymphocyte subsets of the peripheral blood and noise induced hearing loss]. *Sangyo.Igaku.* 35: 3-6.
Ref ID: 514
- Abstract: Biochemical examination and two-color flow cytometric analysis of lymphocyte subsets of the peripheral blood were carried out in 107 healthy males working in high noise environments. The level of hearing disorder was compared with these results. By audiometry at six frequency levels, 51 of the 107 healthy males showed hearing loss. Their mean value of hearing ability was 30 dB and/or above. Among the peripheral lymphocyte subsets, helper T cells of CD4+CD45R- were significantly increased and the CD4/CD8 ratio tended to be elevated. CD20 that indicate B cells were reduced. These results suggested a relationship between susceptibility to acoustic trauma and cell-mediated immunity
184. **Kret,E** (1986): Entstehung und Bewaeltigung von Laermbelastungen - insbesondere Fluglaermbelastungen - bei Kindern Children's coping with stress based on aircraft noise. *Universitaet, Naturwissenschaftliche Fakultaet, Graz* nicht zu ermitteln: 186.
Ref ID: 332
- Abstract: Dissertation (61)
German ABG: Entstehung und Bewaeltigung von Laermbelaestigungen bei Kindern werden am Beispiel des Fluglaerms untersucht. Nach einem Ueberblick ueber die Fluglaermforschung und einer Darstellung relevanter psychologischer Konzepte (Angsttheorien, Repression-Sensitization, Stresstheorien und Coping-Theorien) werden die

Ergebnisse einer Voruntersuchung vorgestellt, in der 45 Kinder mit Fragebogen nach ihrer subjektiven Laermmeinschaetzung befragt wurden. Dabei zeigte sich, dass subjektive Laermgestoertheitsempfindungen und tatsaechliche Laermbelastung in der jeweiligen Lebensumwelt eng zusammenhingen. In der Hauptuntersuchung, an der insgesamt 278 Kinder mit einem Durchschnittsalter von zwoelfeinhalb Jahren teilnahmen, wurden Auswirkungen der Laermbelastung auf das kognitive Leistungsverhalten untersucht. Es zeigte sich, dass Kinder durch Ueberfluggeraesche, die waehrend eines Leistungstests in unregelmassigen Abstaenden eingespielt wurden, schlechtere kognitive Leistungen erbrachten als vergleichbare Kinder in einer Kontrollgruppe. Die angegebene subjektive Fluglaermgestoertheit hatte keinen Einfluss auf die kognitive Leistung. Dass sich die Auspraegungen des subjektiven Gestoertheitsempfinden nicht in erwartetem Mass auf die Leistungen auswirkten, wird hauptsaechlich darauf zurueckgefuehrt, dass bei Kindern in erster Linie die eigene akute Laermbelastung, nicht so sehr aber eine Einstellung, ausgedrueckt durch subjektive Gestoertheitsangaben, Leistungsstoerungen hervorruft.
coping with stress & noise effects in children; subjective annoyance & achievement reduction; cognitive achievement tests & personality measures; total of 323 children; empirical study

185. **Kryter,KD**. Physiological, psychological and social effects of noise. NASA Langley Research Center (ed). NASA-RP-1115, 1-654. 1984. Hampton,VA,USA.

Ref Type: Report
Ref ID: 399

186. **Kryter,KD** (1990b): Aircraft noise and social factors in psychiatric hospital admission rates: a re-examination of some data [published erratum appears in Psychol Med 1990 Nov;20(4):1022]. *Psychol.Med.* 20: 395-411.

Ref ID: 21

Abstract: Jenkins et al. (1981) published data on rates of admission to three psychiatric hospitals for 12 large samples of people living near London's Heathrow Airport. The percentages of people who were classified as being affluent, living alone, males having moved within last five years, unemployed, and immigrants, as well as the levels of aircraft noise to which they were exposed, were given for each of the samples. Multiple-correlation analyses revealed the following: (1) movement of males in the previous five years was not generally associated with hospital admission rates; (2) immigrant status, living alone, and affluence were negatively, and generally statistically significantly, associated with admission rates; and (3) unemployment and level of exposure to aircraft noise were positively, and generally statistically significantly, associated with admission rates. Unlike the conclusion reached by Jenkins et al., it is concluded from the present analysis of their data that there are statistically significant associations between psychiatric hospital admission rates and level of exposure to aircraft noise. This difference in findings appears to be due to a more comprehensive assessment of the interrelations of all the tested socioeconomic and aircraft noise variables by the multiple-correlation procedure used in the present analysis, in comparison with the graphic modelling assessment applied by Jenkins et al. to a limited portion of the socioeconomic data. Together, the five socioeconomic and aircraft noise variables correlate at about 0.98 with hospitalization rates for most population groups

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189. **Kugler,J, Kalveram,KT, Lange,KW** (1990): Acute, not chronic, exposure to unpredictable noise periods affects splenic lymphocytes and plasma corticosterone in the mouse. *Int.J.Neurosci.* 51: 233-234.

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190. **Kurppa,K, Rantala,K, Nurminen,T, Holmberg,PC, Starck,J** (1989): Noise exposure during aregnancy and selected structural malformations in infants. *Scand J Work Environ Health* 15: 111-116.
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Abstract: The study tested the hypothesis of exposure to noise during pregnancy being teratogenic. It included 1,475 Finnish mothers who had given birth to a malformed child (orofacial cleft or structural defect of the central nervous system, skeleton, or heart and great vessels) and 1,475 reference mothers. A special interview soon after delivery yielded the primary information on exposure. Of the 783 mothers who reported noise exposure in the first trimester, 370 were case mothers and 413 were referents. Hygienic assessment indicated that 102 case mothers and 103 referents had been exposed in the first trimester to a sound level of around 80 dB LAeq(8 h) or higher, the overall odds ratio being 1.0 (95% confidence interval 0.7-1.3). Adjustment for potential confounders by logistic regression methods gave similar results. There was no obvious trend suggesting a hazard when different exposure categories were considered
191. **Lathela,K, Niemi,P, Kursela,V, Hyper,K** (1986): Noise and visual choice - reaction time: a large-scale population survey. *Scan.J.Psych.* 76: 89-95.
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192. **Lercher,P, Kofler,W** (1993): Adaptive behaviour to road traffic noise blood pressure and cholesterol. In Vallet,M, editor. *Noise and man 93: Proceedings of the 6th International congress on noise as a public health problem.* Arcueil Cedex, France: INRETS: p Vol 2: 465-468.
Ref ID: 426
Abstract: A socioepidemiologic study was carried out in five rural communities located along transit-traffic routes in the Austrian part of the Alps. 1989 citizens (62%) ages 25 to 64 responded to an interviewer administered questionnaire covering sociodemographic, medical and detailed information on noise related behaviour and annoyance. Noise measurements allowed individual assignment of noise exposure based on 5dBA categories (range 40-75 dBA Leq). Regression analyses showed neither noise level nor annoyance ratings associated with blood pressure in the hypotized direction. Coping variables showed a more constant correlation (in addition adjusted for noise levels). Better coping stratesies less blood pressure. Closing windows during night:-3mmHg SBP, membership in a citizen initiative: -2,1mmHg SBP and -1,7mmHg DBP.
Singnificant lower cholesterol levels for people who closed their windows during night (- 7,3mg/dl) were found.
data adjusted for age, sex, body mass index, education
193. **Lercher,P, Kofler,WW** (1995): Komplexe Antworten auf Umweltbelastungen am Beispiel der Österreichischen Transitverkehrsstudie. *Bundesgesundheitsblatt* 38: 95-101.
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194. **Lercher,P, Widmann,U** (1993): Factors detemrining community response to road traffic noise. In Vallet,M, editor. *Noise and man 93; Proceedings on the 6th International congress on noise as a public health problem.* Arcueil Cedex, France: INRETS, p Vol 2: 201-204.
Ref ID: 427
Abstract: The relationship between noise levels and annoyance was analyzed by means of correlation and regression analysis. Observed correlation for individuals was 0,27 on group level 0,92. (Job 1988: 0.42 vs 0.77mean for 14 international studies on road traffic noise).The overall dose-response curve indicated an upward deviation below levels of 50 dBA as compared to other surveys.
Impaired quaility of life, peceiverd odourous pollution, noise sensitivitzu, homeownership and membership in a citizen initiative showed the mot pronounced modification of the average noise- annoyance response. Smaller effects exhibited factors like windows closing, installed sound proof windows, sleeping room facing road, low ratings on health status, noise related sleeping disturbances.

195. **Levy-Leboyer,C, Moser,G** (1987a): "Individual differences in noise annoyance: four explanations". *Dev.Toxicol.EnvIRON.Sci.* 15: 293-299.
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196. **Levy-Leboyer,C, Moser,G** (1987b): Individual differences in noise annoyance: four explanations. *Dev Toxicol Environ Sci* 15: 293-299.
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197. **Linnemeier,A.** Die Auswirkungen von Lärm auf den natürlichen Nachtschlaf des Menschen-Versuch einer Klassifikation und Bewertung von Veröffentlichungen von 1984 bis 1993. 1995. Dissertation /Düsseldorf.
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198. **Lukassonitz,I** (1992): Increased risk for diseases due to noise? Report of the symposium 'Noise and disease', 26-28 September 1991, Berlin. *Z.Lärmbekämpfung.* 1992; 39: 55-56.
Ref ID: 264
199. **Luke,B, Mamelle,N, Keith,L, Munoz,F, Minogue,J, Papiernik,E et al** (1995): The association between occupational factors and preterm birth: a United States nurses' study. Research Committee of the Association of Women's Health, Obstetric, and Neonatal Nurses. *Am J Obstet Gynecol* 173: 849-862.
Ref ID: 501
Abstract: OBJECTIVE: Our purpose was to evaluate factors associated with preterm birth among a national sample of U.S. nurses. STUDY DESIGN: We conducted a case-control study of 210 nurses whose infants were delivered prematurely (< 37 weeks) (cases) and 1260 nurses whose infants were delivered at term (> or = 37 weeks) (controls). An occupational fatigue score was constructed from four sources and varied from 0 to 4. The relation between occupational activity (including hours working and fatigue score) and preterm birth was analyzed with the use of Pearson chi 2 tests, estimates of odds ratios with 95% confidence intervals, and multivariate logistic regression; we controlled for confounding factors. RESULTS: Factors significantly associated with preterm birth included hours worked per week (p < 0.002), per shift (p < 0.001), and while standing (p < 0.001); noise (p = 0.005); physical exertion (p = 0.01); and occupational fatigue score (p < 0.002). The adjusted odds ratios were 1.6 (p = 0.006) for hours worked per week (< or = 36 vs > 36) and 1.4 (p = 0.02) for fatigue score < 3 vs > or = 3. CONCLUSIONS: Preterm birth among working women may be related to hours worked per day or week and to adverse working conditions
200. **Macnab,A, Chen,Y, Gagnon,F, Bora,B, Laszlo,C** (1995): Vibration and noise in pediatric emergency transport vehicles: A potential cause of morbidity? *AVIAT.SPACE ENVIRON.MED.* 1995; 66: 212-219.
Ref ID: 243
201. **Marfeffe,P.** Répercussions des vols de nuit sur la qualité de vie et de la santé des riverains d'aéroport. 1997. UFCNA.
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202. **Marth,E** (1990): Lärm: Ablauf verschiedener endokriner und biochemischer Reaktionen. *Forum Städte Hygiene* 41: 34-39.
Ref ID: 546
203. **Marth,E, Gallasch,E, Fueger,GF, Mose,JR** (1988): [Aircraft noise: changes in biochemical parameters] Fluglärm: Veraenderung biochemischer Parameter. *Zentralbl.Bakteriol.Mikrobiol.Hyg.B.* 185: 498-508.
Ref ID: 6
Abstract: The effect of stress caused by aircraft noise was studied on 14 female and 11 male volunteers, who were of a age ranging from 21 to 42 years and of a mean age of 25 years. The volunteers were exposed to an aircraft simulator that stimulated the low level flight of an air force plane and produced a maximum noise level of 105 dB(A) for 3 sec. in a short time.

- Before and immediately after the exposure, the concentration of ACTH was measured by means of a radioimmunoassay. The ACTH is a hormone, responsible for initiating a chain reaction that is characteristic for a stress reaction. In 100% of the cases the concentration of this hormone increased. It reached a pathological level in 28% of the cases. The effect on the lipid metabolism was expressed by an increase of total cholesterol and a decrease of the triglycerides in the serum. A slight increase in blood sugar which, together with the free fatty acids, is relatively quickly reduced to energy, could be determined. The aircraft noise did not influence the activity of the liver transaminases in any way. A short-term exposure to aircraft noise is able to stimulate a stress reaction, whereby, the determination of the ACTH offers valuable informations JOURNAL-ARTICLE 0; 0; 57-88-5; 9002-60-2 1988237757 198809
204. **Martinho Pimenta,AJ, Castelo Branco,NA** (1999): Neurological aspects of vibroacoustic disease. *Aviat.Space Environ.Med.* 70: A91-5.
Ref ID: 31
- Abstract: Mood and behavioral abnormalities are the most common early findings related to vibroacoustic disease (VAD). Other signs and symptoms have been observed in VAD patients. Brain MRI discloses small multifocal lesions in about 50% of subjects with more than 10 yr of occupational exposure to large pressure amplitude (> or = 90 dB SPL) and low frequency (< or = 500 Hz) (LPALF) noise. However, to date, there have been no studies globally integrating all the neurological, imaging and neurophysiological data of VAD patients. This is the main goal of this study. METHODS: The 60 male Caucasians diagnosed with VAD were neurologically evaluated in extreme detail in order to systematically identify the most common and significant neurological disturbances in VAD. RESULTS: This population demonstrates cognitive changes (identified through psychological and neurophysiological studies (ERP P300)), vertigo and auditory changes, visual impairment, epilepsy, and cerebrovascular diseases. Neurological examination reveals pathological signs and reflexes, most commonly the palmo-mental reflex. CONCLUSIONS: A vascular pattern underlying the multifocal hyperintensities in T2 MR imaging, with predominant involvement of the small arteries of the white matter, is probably the visible organic substratum of the neurological picture. However, other pathophysiological mechanisms are involved in epileptic symptomatology
205. **Maschke,C.** Der Einfluß von Nachtfluglärm auf den Schlafverlauf und die Katecholaminausscheidung. 1992. TU Berlin.
Ref Type: Thesis/Dissertation
Ref ID: 361
206. **Maschke,C** (1994): Nocturnal traffic noise and stress: results of field and laboratory studies. *Epidemiology Suppl* 6: 28.
Ref ID: 529
207. **Maschke,C, Arndt,D, Ising,H, Laude,G, Thierfelder,W, Contzen,S** (1995b): *Nachtfluglärmwirkungen auf Anwohner* . Stuttgart: Gustav Fischer.
Ref ID: 588
208. **Maschke,C, Arndt,D, Ising,H, Laude,G, Thierfelder,W, and Contzen,S.** Der Einfluss von Nachtfluglärm auf die Stresshormonausscheidung von Flughafenwohnern. Gr.452/8-2. 1994. DFG Forschungsbericht.
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209. **Maschke,C, Arndt,D, Ising,H, Laude,G, Thierfelder,W, Contzen,S** (1995a): [The effect of night time airplane noise on excretion of stress hormones in residents living near airports] Der Einfluss von Nachtfluglärm auf die Stresshormonausscheidung von Flughafenwohnern. *Schriftenr. Ver. Wasser.Boden.Lufthyg.* 96: 1-140,I-XIX.
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210. **Maschke,C, Breinl,S, Grimm,R, Ising,H** (1993): The influence of nocturnal aircraft noise on sleep and on catecholamine secretion. *Schriftenr. Ver. Wasser. Boden. Lufthyg.* 88: 395-407.
Ref ID: 15
- Abstract: The influence of noise from night flying on electro-biological reactions and on the secretion of catecholamines (adrenaline and noradrenaline) was studied in eight healthy adults whose place of residence exposes them to day-time aircraft noise. The interrelationships were then analysed, with daytime noise exposure, personality traits and general day-to-day condition reflected in control variables. The subjects were each observed during five nights without noise exposure ($Leq < 32$ dB(A)) and five nights with noise exposure ($Leq = 36$ to 56 dB(A)), when the following factors were varied: number of flights (16, 32, 64 overflights with a constant maximum indoor sound level of 75 dB(A)); and sound level (64 overflights at a maximum indoor sound level of 55, 65 and 75 dB(A)). All these flights were transmitted electro-acoustically between the third and sixth hours of the night. When the various daytime exposures are taken into account, significant mean value differences between noisy and peaceful nights are demonstrated in 8-hour urine for both catecholamines. In the case of adrenaline, the original data already showed a significant increase with noise exposure. Furthermore, catecholamine concentration increases with sound level. The analysis confirms a close link between the volume of adrenaline in the urine collected and electro-biological reactions, with consideration given to personality traits and day-time alcohol consumption JOURNAL-ARTICLE 51-41-2; 51-43-4 1993212311 199307
211. **Maschke,C, Harder,J** (1998): [Environmental medical action required on exposure to noise] Umweltmedizinischer Handlungsbedarf bei der Larmexposition. *Gesundheitswesen.* 60: 661-668.
Ref ID: 356
- Abstract: Basing on request for an expertise on the medical effects of noise on healthy adults, permissible values for mainly traffic noise were estimated from the literature. If the permissible values are exceeded, preventive medical action is necessary. Below these values the probability of noise-induced health hazards is essentially zero. The authors presume that noise levels above these permissible values, but below the limit of bearability, are an increasing danger to health. Preventive medical action must be weighed against the risk involved in persistent noise, depending on the situation and the need protection. The effect of noise as a health hazard is, apart from the mechanical damage to the inner ear, a psycho-physiological deregulation which can be either indirectly due to the annoyance or directly caused by stress of the vegetative-hormonal system. Therefore different permissible values for annoyance, the stress on the vegetative-hormonal system and for the loss of hearing are suggested, for both continual and maximum noise levels. In addition, deregulation depends on the time of acoustic exposure because the sensitivity to noise follows a 24-hour cycle (circadian rhythm). It is therefore necessary to determine personal permissible limits for the nocturnal noise (sleep disorder). Permissible values for children are also suggested
212. **Maschke,C, Ising,H, Hecht,K** (1997b): Schlaf - nächtlicher Verkehrslärm - Stress - Gesundheit: Grundlagen und aktuelle Forschungsergebnisse. Teil I: Grundlagen. *Bundesgesundheitsblatt* 40: 3-10.
Ref ID: 355
- Abstract: eher allgemeine Zusammenstellung über Schlaf und seine gesundheitliche Bedeutung. Nur einige Hinweise auf Störungen durch Lärm. Allgemeine Beschreibung der Physiologie der Stressreaktion
213. **Maschke,C, Ising,H, Arndt,D** (1995): Nächtlicher Verkehrslärm und Gesundheit: Ergebnisse von Labor- und Feldstudien. *Bundesgesundheitsblatt* : 130-137.
Ref ID: 354
- Abstract: Wird die Intensität eines gewohnten nächtlichen Straßenverkehrslärms erhöht, ist eine vermehrte Cortisolausscheidung zu beobachten. Die relative Erhöhung der Adrenalinausscheidung in der Fluglärm- Feldstudie ist mit 17% deutlich niedriger als in der Laborstudie in welcher eine relative Zunahme von 60% beobachtet wurde. Als Ursache kommt möglicherweise die zusätzliche Verkehrslärmbelastung in der Feldstudie zum Tragen welche nicht kontrolliert wurde. Die relative Erhöhung der Cortisolausscheidung lag in der Feldstudie mit 19% in der gleichen Höhe wie die Veränderung der Adrenalinausscheidung.

- Ein Vergleich der nächtlichen Cortisolausscheidung mit der nächtlichen Adrenalinausscheidung zeigt eine negative Korrelation: In diesen Nächten kommt offensichtlich ein verändertes Stress-Reaktionsmuster zum Tragen. Es ist auch in Situationen mit erhöhtem Straßenverkehrslärm zu beobachten. Ein Zusammenhang zwischen der Anzahl der Überflüge und der Katecholaminausscheidung konnte weder in der Labor- noch in der Feldstudie nachgewiesen werden. Ein Zusammenhang zwischen der Höhe des Überflugpegels und der Katecholaminausscheidung konnte in der Laborstudie, nicht jedoch in der Feldstudie gefunden werden
214. **Maschke,C, Ising,H, Hecht,K** (1997a): Schlaf - nächtlicher Verkehrslärm -Stress - Gesundheit: Grundlagen und aktuelle Forschungsergebnisse. Teil II: Aktuelle Forschungsergebnisse. *Bundesgesundheitsblatt* 40: 86-95.
Ref ID: 353
Abstract: Darstellung und Zusammenfassung mehrerer experimenteller Studien und epidemiologischer Studien zur Frage Fluglärm- Auswirkungen auf Schlaf, Stresshormone, Adrenalin, Cortisol, ACTH(adrenocorticotropes Hormon), Immunsuppression, Hypertonie, Herzinfarkt, gastrointestinale Probleme, Leistung. Beschrieben wird auch die Bedeutung der Wechselwirkung Wohn/Arbeitslärm
215. **Mauss,I, Vogt,J, and Kalveram,KTh.** Trading level for number in the laboratory: Differential effects of aircraft noise on cardiovascular activation, annoyance and assessment of quality of life; Proceedings of the 16th International Congress on Acoustics. 93-94. 1998. Seattle,WA.
Ref Type: Conference Proceeding
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216. **McCarthy,DO, Ouimet,ME, Daun,JM** (1992): The effects of noise stress on leukocyte function in rats. *Res.Nurs.Health* 15: 131-137.
Ref ID: 515
Abstract: It has been reported that exposure to increased noise levels impairs wound healing in surgical patients and in rats. The purpose of the present study was to determine if exposure to noise stress would alter the biological function of neutrophils, macrophages, and lymphocytes, leukocytes that are involved in wound healing. Rats were exposed to 80 db of "rock" music for 24 hr, during which time the control animals were maintained in their usual environment. Leukocyte subpopulations were obtained and stimulated in vitro. Neutrophils and macrophages from noise- exposed animals secreted significantly less superoxide anion and interleukin-1 than cells from control animals. Lymphocyte function was not altered following noise stress. We conclude that short-term exposure of rats to noise stress alters some of the biological functions of leukocytes
217. **McCurdy,DA.** Quantification of advanced turboprop aircraft flyover noise annoyance. NASA Langley Research Center (ed). AIAA PAPER 84-2293, 1-9. 1984. Hampton, VA, USA.
Ref Type: Report
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218. **McCurdy,DA and Powell,CA.** Annoyance caused by propeller airplane flyover noise. NASA Langley Research Center (ed). NASA-TP-2356, 1-52. 1984. Hampton,VA,USA.
Ref Type: Report
Ref ID: 403
219. **McDonald,AD, McDonald,JC, Armstrong,B, Cherry,NM, Nolin,AD, Robert,D** (1988): Prematurity and work in pregnancy. *Br J Ind Med* 45: 56-62.
Ref ID: 502
Abstract: The frequency of low birth weight (less than or equal to 2500 g) and of preterm birth (less than 37 weeks) was studied in 22,761 single live births in relation to maternal employment, taking account of 11 nonoccupational confounding factors. There was some increase of low statistical significance in both types of prematurity in service and manufacturing sectors of industry. A substantial excess of preterm births was seen in women employed in food and beverage service (O/E = 1.29, p = 0.03) and psychiatric nursing (O/E = 2.47, p less than 0.01) and of low birth weight in food and beverage service (O/E = 1.30, p = 0.02), in chambermaids and cleaners (O/E = 1.42, p = 0.03), and in those employed in the

manufacture of metal and electrical and certain other goods (O/E = 1.57, p less than 0.01). Heavy lifting and long hours of work were consistently related to both outcomes, changing shift work less consistently. Noise was associated with low birth weight in the health and manufacturing sectors. The findings of this study are unlikely to have resulted from subject or observer bias but the role of unidentified factors related to selection for work are difficult to assess

220. **Meecham,WC, Shaw,NA** (1993): Increase in mortality rates due to aircraft noise. *Schriftenr.Ver.Wasser.Boden.Lufthyg.* 88: 428-441.
Ref ID: 63

Abstract: In a study using data from the 1970-1980 decade, we find that people near Los Angeles International Airport (LAX) suffer a 5% increase in mortality rates due to increases in a number of fatal diseases. We comment also on the effect of changes in noise level over the last decade. It is found that there is an 18% increase in cardiovascular deaths, for people over 75 at a 97% confidence level, in areas around the airport. Approximately 200,000 people are involved in the study, split into two groups, test and control, near LAX. The two areas were adjusted to be alike in race, age and economic level. The number of suicides in the age bracket 45-54 was increased by the jet noise by over 100% at a 99% confidence level. Total accidental deaths increased by over 60% in the age group above 75 at a 96% confidence level. If we add together all increases there are an average of 24 extra deaths due to aircraft, primarily jet, noise in the high noise area. If we included all people living within the extended high noise contour, there is reason to believe that there is an increase of over 60 deaths in the LAX area per year

221. **Meis,M** (1998): *Zur Wirkung von Laerm auf das Gedaechnis Explizite und implizite Erinnerungsleistungen fluglaermexponierter Kinder im Rahmen einer medizinpsychologischen Laengsschnittstudie On the impact of noise on memory. Explicit and implicit recall performance of air-traffic-noise exposed children within a medical-psychological longitudinal study* : Kovac, Hamburg.
Ref ID: 318

Abstract: German ABG: Effekte chronischer Fluglaermexposition auf die Gedaechnisleistungen von Kindern wurden untersucht. An drei Experimenten waren 393 Kinder im Alter von 9 bis 12 Jahren beteiligt, die chronisch laermexponiert versus nicht laermexponiert lebten. In Experiment I wurden Leistungen des Arbeitsgedaechnisses untersucht, in Experiment II bearbeiteten die Kindern unter intentionaler Lerninstruktion Verstaendisfragen zu komplexen Texten in einem mittleren Lern-Pruef-Intervall von einem Tag bis zu drei Tagen und in Experiment III wurde das implizite Gedaechnis mit einem neuen Gedaechnistest untersucht. Die laermexponiert und die nicht laermexponiert lebenden Kinder waren nach soziodemographischen Merkmalen vergleichbar. Die Befunde zeigen, (1) dass sich weder im Quer- noch im Laengsschnitt durch die Exposition chronischen Fluglaerms Nachwirkungen auf die Leistungen des Arbeitsgedaechnisses ergaben, (2) dass Unterschiede in Behaltensleistungen nur bei aktuell bestehender Fluglaermexposition auftreten, (3) dass entsprechende Effekte reversibel sind, (4) dass Leistungsver schlechterungen erst mit einer Verzoegerung von eineinhalb Jahren nachweisbar sind, (5) dass das Alter der Kinder kein bedeutsamer Moderator entsprechender Effekte ist und (6) dass die koerperliche Aktivierung, die Laermwahrnehmung und die psychische Verfassung der Kinder keine Mediatoren der Effekte sind. Die Ergebnisse erhaerten die Hypothese, dass diskontinuierlicher Laerm als eine Informationsquelle wirkt, die permanent ueberwacht wird. Diskontinuierlicher Laerm bindet somit kognitive Ressourcen, die sich mit denen zur Bearbeitung von Gedaechnisaufgaben ueberschneiden. Die laborexperimentell induzierte Aufmerksamkeitsteilung schraenkt elaborierte Enkodierungsprozesse ein, wodurch Defizite in der Behaltensleistung bei bestehender diskontinuierlicher Fluglaermexposition erklart werden koennen.

222. **Melamed,S, Froom,P, Kristal-Boneh,E, Gofer,A** (1997): Industrial noise exposure, noise annoyance and serum lipid levels in blue-collar workers - the CORDIS study. *Arch.Environ.Health* 52: 292-298.
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223. **Meyer,RE, Aldrich,TE, Easterly,CE** (1989): Effects of noise and electromagnetic fields on reproductive outcomes. *Environ Health Persp* 81: 193-200.
Ref ID: 448
224. **Michalak,R, Ising,H, Rebentisch,E** (1990): Acute circulatory effects of military low-altitude flight noise. *Int.Arch.Occup.Environ.Health* 62: 365-372.
Ref ID: 66
Abstract: Volunteers aged 70 to 89 years living in a senior citizen's home in Haifa were exposed to flight noise via earphones while watching video films. Their blood pressure and heart rates were measured simultaneously. A high-quality recording and reproduction technique was employed. They were exposed to the noise of two to three overflights with $L_{max} = 99-114$ dB(A) and slow sound pressure level increase (aircraft take off) or with $L_{max} = 95-112$ dB(A) and a fast sound pressure level increase (low- altitude flight at high subsonic speed) at intervals of 10 to 15 min. The systolic and diastolic blood pressure was raised at $L_{max} = 112$ dB(A) and high speed level increase at the average of 23 and 13 mmHg, respectively with individual maximal values of about 40 mm Hg (systolic). In order to prevent risks to the subjects' health, the noise exposure was not raised to levels above 112 dB(A) and fast level increase, although $L_{max} = 125$ dB(A) has been measured in 75 m-low-altitude flight areas. The blood pressure response to a repeated single exposure increased in proportion to the preceding noise exposure. At high intensities and fast level increase an up to fourfold reaction intensification was detected in the majority of subjects. This change in reactivity is regarded as the result of sensitization toward the special type of noise and the implications of these observations for the long- term effects of chronic exposure to low-altitude flight noise are considered. On the basis of these results, proposals are made for limiting values for L_{max} and for the speed of sound pressure level increase, the implementation of which would lead to a marked reduction in health risks from low-altitude flight noise
225. **Miedema,HME.** Geluidmaten voor vliegverkeer. TNO (ed). NIPG-TNO C019 1993. 1993. Leiden, TNO.
Ref Type: Report
Ref ID: 545
226. **Miedema,HME, Vos,H** (1998): Exposure-response relationships for transportation noise. *J.Acoust.Soc.Am.* 104: 3432-3445.
Ref ID: 142
Abstract: This article presents synthesis curves for the relationship between DNL and percentage highly annoyed for three transportation noise sources. The results are based on all 21 datasets examined by Schultz [J. Acoust. Soc. Am. 64, 377-405 (1978)] and Fidell et al. [J. Acoust. Soc. Am. 89, 221-233 (1991)] for which acceptable DNL and percentage highly annoyed measure could be derived, augmented with 34 datasets. Separate, nonidentical curves were found for aircraft, road traffic, and railway noise. A difference between sources was found using data for all studies combined and for only those studies in which respondents evaluated two sources. The latter outcome strengthens the conclusion that the differences between sources cannot be explained by differences in study methodology
227. **Miedema,HME, Vos,H** (1999): Demographic and attitudinal factors that modify annoyance from transportation noise. *J.Acoust.Soc.Am.* 3336-3344.
Ref ID: 216
Abstract: The effect of demographic variables (sex, age, education level, occupational status, size of household, homeownership, dependency on the noise source, and use of the noise source) and two attitudinal variables (noise sensitivity and fear of the noise source) on noise annoyance is investigated. It is found that fear and noise sensitivity have a large impact on annoyance (DNL equivalent equal to [at most] 19 and 11 dB, respectively). Demographic factors are much less important. Noise annoyance is not related to gender, but age has an effect (DNL equivalent equal to 5 dB). The effects of the other demographic factors on noise annoyance are (very) small, i.e., the equivalent DNL difference is equal to 1-2 dB, and, in the case of dependency, 3 dB. The results are based on analyses of the original data from various previous field surveys of response to noise from transportation sources (number of cases depending on the variable between 15 000 and 42000)

228. **Morrell,S, Taylor,R, Carter,NL, Job,RFS, Peploe,P** (1998): Cross-sectional relationship between blood pressure of school children and aircraft noise. In Job,RFS, Carter,NL, editors. *Noise Effects: Proceedings of the 7th International congress on noise as a public health problem*. Sydney, Australia: Pty.Ltd., p Vol 1: 275-279.
Ref ID: 351
229. **Morrell,S, Taylor,R, Carter,NL, Job,RFS, and Peploe,P.** Measuring blood pressure in noisy environments: how much do aircraft overflights affect blood pressure readings? 1999.
Ref Type: Personal Communication
Ref ID: 352
230. **Morrell,S, Taylor,R, Lyle,D** (1997): A review of health effects of aircraft noise. *Aust.N.Z.J.Public Health* 21: 221-236.
Ref ID: 57

Abstract: Social surveys have established dose-response relationships between aircraft noise and annoyance, with a number of psychological symptoms being positively related to annoyance. Evidence that exposure to aircraft noise is associated with higher psychiatric hospital admission rates is mixed. Some evidence exists of an association between aircraft noise exposure and use of psychotropic medications. People with a pre-existing psychological or psychiatric condition may be more susceptible to the effects or exposure to aircraft noise. Aircraft noise can produce effects on electroencephalogram sleep patterns and cause wakefulness and difficult in sleeping. Attendances at general practitioners, self-reported health problems and use of medications, have been associated with exposure to aircraft noise, but some findings are inconsistent. Some association between aircraft noise exposure and elevated mean blood pressure has been observed in cross-sectional studies of schoolchildren, but with little confirmation from cohort studies. There is no convincing evidence to suggest that all-cause or cause-specific mortality is increased by exposure to aircraft noise. There is no strong evidence that aircraft noise has significant perinatal effects. Using the World Health Organization definition of health, which includes positive mental and social wellbeing, aircraft noise is responsible for considerable ill-health. However, population-based studies have not found strong evidence that people living near or under aircraft flight paths suffer higher rates of clinical morbidity or mortality as a consequence of exposure to aircraft noise. A dearth of high quality studies in this area precludes drawing substantive conclusions JOURNAL-ARTICLE; REVIEW; REVIEW,-TUTORIAL 1997304722

231. **Murata,M, Takigawa,H, Sakamoto,H** (1993): Teratogenic effects of noise and cadmium in mice: does noise have teratogenic potential? *J Toxicol Environ Health* 39: 237-245.
Ref ID: 503

Abstract: The teratogenicity of combined exposure to noise and cadmium was studied in mice. ICR mice were exposed to a wide octave-band of noise at 100 dB(C) for 6 h on d 7 of pregnancy in one of two ways: continuous exposure or intermittent (15 min on/15 min off). Cadmium sulfate at 1 or 2 mg/kg was intraperitoneally injected on d 7 of pregnancy. Four groups were exposed to both cadmium and noise. On d 18 of pregnancy, fetuses were examined for external and skeletal malformations. Another experiment was performed with two other patterns of noise exposure: continuous exposure for 3 h, and intermittent exposure (5 min on/5 min off) for 6 h on d 7 of pregnancy. In the groups exposed to continuous noise for 6 h, total percentages of malformed fetuses were significantly higher than that in the control group, but there were no significant increases of total percentages of fetal malformations in the combined treatment groups in comparison with the groups given the same dose of cadmium alone. The percentages of skeletally malformed fetuses in groups exposed to 6 h of continuous noise were significantly higher than in groups that received saline or the same dose of cadmium. There were no significant differences in the total percentages of malformed fetuses between the control group and the groups exposed to a total of 3 h of noise, whether continuously or intermittently. Although combined treatment with cadmium and noise resulted in an increase of total percentages of malformed fetuses compared to the same dose of cadmium alone, the interactions between cadmium and noise showed no synergistic effect on teratogenicity. The magnitude of teratogenicity due to noise is much weaker than that of cadmium, and is therefore easily masked by that of cadmium in statistical tests of the significance of differences

232. **Niemtzow,RC** (1993): Loud noise and pregnancy. *Mil.Med.* 158: 10-12.
Ref ID: 188
233. **Nikolic,M, Gec,M, Ivanovic,S, Micic,J, Sulovic,V, Nikolic,G et al** (1991): [Specific hormone reactions to aircraft noise in pregnant women] Specificnosti hormonskog reagovanja trudnica na dejstvo avionske buke. *Glas.Srp.Akad.Nauka.Med.* 41: 81-85.
Ref ID: 89
Abstract: In order to find out if there is some specific hormonal reaction to JET aircraft noise, a group of eight pregnant women, living in a small suburban community near the airport "Beograd", were investigated. Pregnant women in the first three-months of pregnancy were exposed to the aircraft noise of 75-85 dB/A during 60 minutes, before and after that blood and urine samplers were taken for analyses. Those preliminary result of the level of cortisone, cortisol, testosterone and prolactin suggested that aircraft noise modified the hormonal reaction. Further investigation is needed in order to point out some other possibilities
234. **Nivison,ME, Endresen,IM** (1993): An analysis of the relationship among environmental noise annoyance and sensitivity to noise and the consequencec for health and sleep. *J Behav Med* 16: 257-276.
Ref ID: 430
235. **Nomoto,Y, Karasawa,S, Uehara,K** (1994): Effects of hydrocortisone and adrenaline on natural killer cell activity. *Br J Anaesth.* 73: 318-321.
Ref ID: 522
Abstract: We have studied the effects of hydrocortisone and adrenaline on natural killer (NK) cell activity and on the distribution of circulating lymphocyte subpopulations in 30 patients undergoing elective partial laminectomy under general anaesthesia. The patients were allocated to receive adrenaline (group 1, n = 11), hydrocortisone and adrenaline (group 2, n = 11) or neither hydrocortisone nor adrenaline (group 3, n = 8). Group 1 and group 2 patients received local adrenaline infiltration during operation to reduce bleeding. The mean dose of adrenaline administered was 2.1 (SD 0.2) microgram kg-1. Group 2 received hydrocortisone 10 mg kg-1 i.v. after premedication. In groups 1 and 2, adrenaline produced an instantaneous increase in NK cell activity accompanied by a selective increase in circulating NK cells. The measurements returned to pre-infiltration levels within 120 min of administration of adrenaline. The effect of adrenaline in causing increased NK cell activity was not blocked by pre-administration of hydrocortisone. There was a significant decrease in the ratio of T-helper/inducer cells (CD4) to T-suppressor/cytotoxic cells (CD8) in all patients after induction of anaesthesia. In groups 1 and 3, the CD4/CD8 of anaesthesia. In groups 1 and 3, the CD4/CD8 cell ratio did not change significantly during operation. However, compared with groups 1 and 3, group 2 showed a significantly reduced CD4/CD8 cell ratio during operation. Therefore, these results suggest that even in cases of such severe stress that the immune response was depressed by increased serum cortisol concentrations, adrenaline-induced NK cell activity enhancement was preserved
236. **N.N.** (1984): Reaction to community noise. *Physiol.,Psychol.and Social Effects of Noise* : 525-606.
Ref ID: 406
Abstract: Most of the research on reactions of people to community noise is divided into studies of annoyance as measured by attitude surveys and annoyance as measured by complaint behavior, including legal actions. This research has provided means of testing the concept promulgated over 20 years ago that the average amount of noise energy from significant sources that intrudes daily into houses and living areas can be used to predict the impact of the noise on people in a community. However, research data on annoyance and complaint behavior collected over the past 10 to 20 years have shown that there are significant limitations and variables that must be considered in the fair application of the noise energy concept in its simplest form.

237. **Nurminen,T, Kurppa,K** (1989): Occupational noise exposure and course of pregnancy. *Scand J Work Environ Health* 15: 117-124.
Ref ID: 505

Abstract: The study examined the possible relation of occupational noise exposure to adverse pregnancy outcomes. The experience of 1,190 reference mothers from a case-referent study based on the Finnish Register of Congenital Malformations was scrutinized. Exposure to noise was blindly assessed from a description of the mother's workday by two industrial hygienists. Women with an estimated level of noise of around 80 dB LAeq(8 h) or higher were considered exposed. Threatened abortion was not associated with noise exposure alone, but, when it was combined with shift work, the adjusted risk was over twofold. The adjusted risk of pregnancy-induced hypertension was twice as high among the mothers exposed to noise in shift work, and the duration of their pregnancy was shorter. The analyses produced indications of a relation between noise and growth retardation which was not connected with shift work. There were significantly ascending trends in the proportions of these outcomes according to increasing exposure intensity

238. **Nurminen,T, Lusa,S, Ilmarinen,J, Kurppa,K** (1989): Physical work load, fetal development and course of pregnancy. *Scand J Work Environ Health* 15: 404-414.
Ref ID: 504

Abstract: The effects of physical work load during pregnancy were analyzed in connection with a nationwide case-referent study that screened for associations between selected structural malformations and occupational exposures. The strain of the occupational activities of 1475 mothers of malformed infants and an equal number of mothers of noncase babies was assessed from a description of the work tasks by an expert using a standardized method reflecting energy expenditure. The noncase mothers' experience revealed a relation between physical load and growth retardation that has also been suggested by other epidemiologic studies. No relation was found between an increase in mean physical load and the occurrence of threatened abortion; yet work involving much standing had an increased risk. Mothers whose work included occasional high physical loads had more pregnancy-induced hypertension. The data showed unexpected associations between physical load and structural malformations

239. **Ollerhead,JB, Jones,CJ, Cadoux,RE, Woodley,A, Atkinson,BJ, Horne,JA, Pankhurst,F, Reyner,L, Hume,KI, Van,F, Watson,A, Diamond,ID, Egger,P, Holmes,D, and McKean,J.** Report of a field study of aircraft noise and sleep disturbance. 1992. Department of Transport from the Department of Safty, Environment and Engineering; Civil Aviation Authority.
Ref Type: Report
Ref ID: 367

Abstract: Current restrictions at Heathrow and Gatwick airports are based , in part on studies of effects of airport noise on sleep carried out more than ten years ago. As these policies were due to be reviewed the department of Transportation asked the Civil Aviation Authority to undertake further studies of aircraft noise and sleep disturbance. with emphasis on objective measures. The study has been conducted by the CAA in conjunction with research teams from the university of Loughborough, Manchester Metropolitan and Southampton.---- Studied were the relationship between outdoor aircraft noise level!!!! and the probability of sleep disturbances and the variation of these relationships with night. EEG and actimetry was used and the correlation of these two parameters were established in a perexperiment.---- 8 Study areas, 400 subjects, 5742 nights in all, EEG 46 Subjects (178 nights 3% of all) , interviews, diaries, outdoor noise measures, criterion for disturbance= arousal from sleep (own definition), individual sensitivity. Results: Below outdoor levels 90dBA SEL (80 dBA Lmax) aircraft noise events are most unlikely to cause a measurable increase in the overall rate of sleep disturbance. For outdoor levels 80/95 dBA Lmax the chance of being wakened is about 1:75.Great interindividual differences. Sensitive subjects more than twice . Man 15% more disturbed than women -- same rate for all disturbances not only aircraft noise. No difference of awakenings between large jets, small chapter two or three jets or propeller aircraft types No significant effect of lenght of residence.

240. **Otten,H, Schulte,W, and von Eiff,AW.** Traffic noise, blood pressure and other risk factors: The Bonn traffic noise study ; Proceedings of the 5th International Congress on Noise as a Public Health Problem. Berglund, U., Berglund, B., and Lindvall, T. (eds). 4, 327-335. 1990. Stockholm, Sweden, Swedish Council for Building Research.
Ref Type: Conference Proceeding
Ref ID: 577
241. **Öhrström,E** (1989): Sleep disturbance, psycho-social and medical symptoms- a survey among persons exposed to high levels of road traffic noise. *J Sound Vibr* 133: 117-128.
Ref ID: 551

Abstract: The effect of stress caused by aircraft noise was studied on 14 female and 11 male volunteers, who were of a age ranging from 21 to 42 years and of a mean age of 25 years. The volunteers were exposed to an aircraft simulator that stimulated the low level flight of an air force plane and produced a maximum noise level of 105 dB(A) for 3 sec. in a short time. Before and immediately after the exposure, the concentration of ACTH was measured by means of a radioimmunoassay. The ACTH is a hormone, responsible for initiating a chain reaction that is characteristic for a stress reaction. In 100% of the cases the concentration of this hormone increased. It reached a pathological level in 28% of the cases. The effect on the lipid metabolism was expressed by an increase of total cholesterol and a decrease of the triglycerides in the serum. A slight increase in blood sugar which, together with the free fatty acids, is relatively quickly reduced to energy, could be determined. The aircraft noise did not influence the activity of the liver transaminases in any way. A short-term exposure to aircraft noise is able to stimulate a stress reaction, whereby, the determination of the ACTH offers valuable informations
242. **Öhrström,E.** Effects of low levels from road traffic noise during night- a laboratory study on number of events, maximum noise levels and noise sensitivity. Proceedings of the 6th International Congress on Noise as a Public Health Problem. Vallet, M. (ed). 3, 359-366. 1993. Arcueil, Cedex, France, INRETS.
Ref Type: Conference Proceeding
Ref ID: 598
243. **Öhrström,E.** Effects of low levels from road traffic noise during night. A laboratory study on number of events, maximum noise levels and noise sensitivity. Vallet, M. (ed). 1, 56-56. 1993. Nice, INRETS. Noise as a public health problem.Proceedings of the 6th International Congress.
Ref Type: Conference Proceeding
Ref ID: 486
244. **Öhrström,E** (1993a): Research on noise and sleep since 1988: Present state. In Vallet,M, editor. *Noise and Man 93: Proceedings of the 6th International congress on noise as a public health problem.* Arcueil Cedex, France: INRETS, p Vol 1: 52-52.
Ref ID: 434
245. **Öhrström,E, Björkman,M** (1988): Effects of noise disturbed sleep: A laboratory study on habituation and subjective noise sensitivity. *J Sound Vibr* 122: 277-290.
Ref ID: 550

Abstract: The effect of stress caused by aircraft noise was studied on 14 female and 11 male volunteers, who were of a age ranging from 21 to 42 years and of a mean age of 25 years. The volunteers were exposed to an aircraft simulator that stimulated the low level flight of an air force plane and produced a maximum noise level of 105 dB(A) for 3 sec. in a short time. Before and immediately after the exposure, the concentration of ACTH was measured by means of a radioimmunoassay. The ACTH is a hormone, responsible for initiating a chain reaction that is characteristic for a stress reaction. In 100% of the cases the concentration of this hormone increased. It reached a pathological level in 28% of the cases. The effect on the lipid metabolism was expressed by an increase of total cholesterol and a decrease of the triglycerides in the serum. A slight increase in blood sugar which, together with the free fatty acids, is relatively quickly reduced to energy, could be determined. The aircraft noise did not influence the activity of the liver transaminases in any way. A short-term exposure to aircraft

- noise is able to stimulate a stress reaction, whereby, the determination of the ACTH offers valuable informations
246. **Öhrström,E, Björkman,M, Rylander,R** (1988): Noise annoyance with regard to neurophysiological sensitivity, subjective noise sensitivity and personality variables. *Psychol Med* 18: 605-613.
Ref ID: 490
247. **Öhrström,E, Björkman,M, Rylander,R** (1990): Effects of noise during sleep with reference to noise sensitivity and habituation. *Environment International* 16: 477-482.
Ref ID: 488
- Abstract: The effect of road traffic noise was investigated among noise sensitive and noise non-sensitive subjects in a two week laboratory study. Physiological effects on heart rates and body movements in connection with noise events were found neither of which decreased toward the end of the noise period. A significant effect on sleep quality was found only among the sensitive subjects. A negative influence of noise on sleep quality, mood and performance was just as pronounced after the least as after the first noisy nights. Preliminary results from a laboratory study on the importance of the number of noise events showed that there is a threshold for effects on sleep quality around 10 events/night for 60 dB(A). For FDA, a significant decrease in sleep quality was seen at 64 events/night. Results from field study in areas characterized by heavy noise suggest that noise during night hours causes different psycho-social and medical symptoms and that decreased sleep quality is more frequent among noise-sensitive individuals.
248. **Öhrström,E, Björkman,M, and Rylander,R.** Primary and after effects of noise during sleep with reference to noise sensitivity and habituation: studies in laboratory and field. Proceedings of the 5th Congress on noise as a public health problem. Berglund, B. and Lindvall, T. (eds). 5, 55-63. 1999. Stockholm, Sweden, Swedish Council for Building Research.
Ref Type: Conference Proceeding
Ref ID: 555
249. **Öhrström,E, Rylander,R** (1990): Sleep disturbance by road traffic noise- a laboratory study on number of noise events. *J Sound Vibr* 143: 93-101.
Ref ID: 566
250. **Pankhurst,FP and Horne,JA.** The influence of bed partners on movement during sleep. *Sleep*. 17[4], 308-315. 1994.
Ref Type: Journal (Full)
Ref ID: 3
- Abstract: Two related studies are reported. Both involved the use of wrist actimetry and morning sleep logs in subjects 23-67 years of age. In the first study, 46 pairs of bed partners were monitored for 8 nights to assess the extent and concordance of their body movements, and whether the latter exhibited age and gender differences. The second study concentrated on the presence or absence of a bed partner, and included subjects who either habitually slept alone or whose usual partner was absent for at least 1 night. Men showed a significantly greater number of discrete movements during sleep than did women. Overall, 5-6% of all 30-second sleep epochs contained such movements, with about 1/3 of these movements being common (within the same epoch) to both partners. This concordance was highest in younger couples. Female bed partners reported being disturbed more often by their partner than was the case for male partners. Subjects sleeping with a partner showed a greater number of discrete movements than matched subjects who slept alone. Movements decreased during temporary absence of the usual bed partner. Couples seemed unaware of the similarity in the timing of their movements during sleep, and most reported sleeping better when their bed partner was present JOURNAL-ARTICLE 1995063568 199502
251. **Parrot,J, Petiot,JC, Loberau,JP, Smolik,HJ** (1992): Cardiovascular effects of impulse noise, road traffic noise and intermittent pink noise at LAeq=75dB, as a function of sex, age and level of anxiety: A comparative study. *Int Arch Occup Environ Health* 63: 477-484.
Ref ID: 575

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252. **Passchier-Vermeer,W.** Noise and Health. No.A93/02E. 1993. The Hague: Council of Netherlands.
Ref Type: Report
Ref ID: 437
253. **Patterson,RE, Rayman,RB** (1996): Aerospace air pollution issues. *Otolaryngol.Head.Neck Surg.* 114: 277-280.
Ref ID: 146
Abstract: Practitioners of aerospace medicine are mindful of the environmental effects, particularly air pollution, caused by aviation and spaceflight operations. To an aerospace medicine specialist, the environment includes not only the air, water, and soil of the earth, but also the cabin milieu of aircraft and space vehicles where crews must work, sleep, and in some cases, live. Consequently, this article will address the following areas of concern: cabin air quality of aircraft, cabin air quality of space vehicles, noise, air pollution, and aerial spraying JOURNAL-ARTICLE 0; 0 1996225857 199609
254. **Pearson,KS, Barber,DS, and Tabachnick,BG.** Analyses of the predictability of noise induced sleep disturbance. AD-A220 156. 1989. Canoga Park, BBN Systems and Technologies Corporation.
Ref Type: Report
Ref ID: 549
255. **Pearson,KS, Barber,DS, and Tabacknick,BG.** Analysis of the predictability of noise induced sleep disturbance. AD-A220156. BBN Systems and Technologies Corporation, Canoga Park and US Air Force Report HSD-TR-89-029/1990. 1989.
Ref Type: Report
Ref ID: 484
256. **Pearson,KS, Barber,DS, Tabchnick,BG, Fidell,S** (1995): Predicting noise-induced sleep disturbance. *J Acoust Soc Am* 97: 331-338.
Ref ID: 482
257. **Peoples,S, Siegel,E, Suchindran,CM, Origasa,H, Ware,A, Barakat,A** (1991): Characteristics of maternal employment during pregnancy: effects on low birthweight [see comments]. *Am J Public Health* 81: 1007-1012.
Ref ID: 507
Abstract: BACKGROUND: Although maternal employment is considered a risk factor for low birthweight (LBW), the manner in which employment might affect birthweight is poorly understood. In this analysis, selected characteristics of employment during pregnancy were examined for effects on pregnancy outcomes. METHODS: Work characteristics included the number of hours per week, physical activities, and environmental conditions. The outcomes of interest were fetal growth retardation (less than 2500 grams at term) and preterm delivery (less than 37 weeks). The study population consisted of 2711 non-Black, married mothers who participated in the 1980 National Natality Survey (NNS). The NNS data were merged with data from the 1977 revision of The Dictionary of Occupational Titles (DOT) from which measures of occupational physical activities and environmental exposures were obtained. Logistic regression was used in the analysis. RESULTS: Those who worked 40 or more hours per week were more likely than women who worked fewer hours to have a low birthweight delivery at greater than or equal to 37 weeks. No physical or environmental characteristics of work were associated with low birthweight or preterm delivery. CONCLUSIONS: Non-Black married American women may face a risk of delivering low-birthweight babies at or near term only if they work 40 or more hours each week. However, the lack of risk associated with other characteristics of work may be a function of measurement error in the DOT data source or of low levels of exposure in the analysis population
258. **Pfoertner,K** (1993): Auswirkungen des militaerischen Tieffluges auf das Verhalten und die Psyche von Kindern Effects of military low-level flights on children's behavior and mental state. *Roderer, Regensburg* 13.07.1993: 226-Series.
Ref ID: 327

Abstract: Dissertation (61)

German ABG: In einer handlungstheoretisch fundierten Studie wird der Frage nachgegangen, ob sich militaerischer Tiefflug mit seinen optischen und akustischen Folgen auf das Verhalten und die Psyche von Kindern auswirkt. Von 71 Kindern im Alter zwischen einem und sechs Jahren wurden ueber einen Zeitraum von sechs Monaten Protokolle ueber ihr Verhalten waehrend Tiefflugen angefertigt. Die Ergebnisse zeigten, dass die Kinder sehr haeufig in ihren Handlungen unterbrochen wurden. Sie erlebten Angst, die sich bis zur Panik steigerte. Sie suchten unter Treppen oder Bueschen, im Haus und sogar in Schraenken Schutz vor dem Laerm. In den ausgewiesenen Nachtflugstrecken spielte die Unterbrechung des Schlafes eine erhebliche Rolle. Durch die Unvorhersagbarkeit und Unkontrollierbarkeit ist an die Entstehung einer "erlernten Hilflosigkeit" zu denken. Sich entwickelnde Stoerungen z. B. auf den Gebieten der Konzentration, der Motivation und im sozio-emotionalen Bereich sind als Folge des Tiefflugs zu sehen. Daneben geben die uebenden Kampfflugzeuge ein Lernmodell fuer aggressive Konfliktloesungen ab. (Autor/Udo Wolff - ZPID)

military low-level flights; effects on children's behavior & emotional states; visual & auditory disturbances; anxiety & sleep disorders & escape behavior; 6 months behavior records; 71 children aged 1-6; empirical study

259. **Pollak,CP** (1991): The effects of noise on sleep. In Fay,TH, editor. N.Y.,USA: N.Y Academy of Medicine.
Ref ID: 473

260. **Poustka,F** (1991): *Die physiologischen und psychischen Auswirkungen des militaerischen Tiefflugbetriebs* *Physiological and psychological effects of military low-altitude flights* : Huber, Bern.
Ref ID: 312

Abstract: German ABG: Inhalt: (A) Einfuehrung. (1) R. Guski: Laermwirkungen aus der Perspektive der oekologischen Psychologie. - (B) Physikalische und physiologische Messungen. (2) H. Strauch: Geraeuschimmissionen durch tieffliegende Militaerflugzeuge. (3) M. Spreng: Besondere Charakteristika von Tiefflugschallereignissen - Hoerschadensmoeglichkeit und psychophysiologische Erregungskorrelate. (4) A. Meyer-Falcke und G. Jansen: Physiologische Funktionsaenderungen bei Beschallung durch Flugzeugtriebwerke. (5) H. G. Dieroff: Wie reagiert das Hoersystem auf kurzzeitige Schallereignisse mit hohen Schalldruckspitzen? (6) M. Pilgramm: Impulslaermschaeden bei Soldaten. - (C) Belaestigungen und Psychophysiologie. (7) J. Vos: Belaestigung durch gleichzeitigen Impuls-, Strassenverkehrs- und Luftverkehrs-laerm. (8) J. Hoernagl, P. Brussee und P. Lercher: Untersuchungen komplexer Transitverkehrsauswirkungen auf die Wohnbevoelkerung entlang der Autobahnen in Tirol. (9) E. Stephan: Einfluesse von Tiefflugen auf Physiologie und Verhalten von domestizierten Wirbeltieren. (10) W. Schulte und H. Otten: Auswirkungen des militaerischen Tieffluglaerms auf das Blutdruckverhalten bei Kindern. (11) K. Schmeck: Psychophysiologische Auswirkungen des militaerischen Tiefflugbetriebs auf Kinder und Jugendliche. Ergebnisse einer Felduntersuchung in Westfalen. - (D) Psychische Auswirkungen auf Kinder. (12) I. Curio und M. Meador: Angsterleben von Kindern in einem Tieffluggebiet im Vergleich zu einem Kontrollgebiet. (13) F. Poustka: Psychische Auffaelligkeiten bei Kindern in Gebieten unterschiedlicher Tiefflugaktivitaeten. Ergebnisse einer Felduntersuchung in Westfalen. (14) H. Ising u.a.: Belaestigung und Gesundheitsgefaehrdung durch militaerischen Tieffluglaerm. - (E) Soziologische und Untersuchungen von Einstellungen gegenueber Fluglaerm. (15) D. Oremus und J. Estermann: Wirkung von Tieffluguebungen in Norddeutschland - Angst, Einstellungen und Handlungsmuster verschiedener Strata. (16) W. Schluchter: Bei Sonne gibt es in der Pfalz Krieg. Ergebnisse sozialwissenschaftlicher Laermwirkungsforschung. - (F) Rechtsprechung und Fluglaerm. (17) W. Seibert: Rechtsprechung und Rechtslage im Zusammenhang mit militaerischer Tiefflugtaetigkeit.

261. **Poustka,F, Eckermann,P, Schmeck,K** (1992): Effect of aircraft noise and psychosocial stressors on mental disturbances of children and adolescents: An epidemiological survey in Westphalia Auswirkungen von Flugzeuglaerm und psychosozialen Stressoren auf psychische Stoerungen bei Kindern und Jugendlichen: Eine epidemiologische Umfrage in Westfalen. In Remschmidt,H, Schmidt,MH, editors. *Developmental psychopathology, Hogrefe & Huber, Bern, 1992, Seiten 83-96 Series: Child and youth psychiatry. European perspectives, Vol. 2:*

Hogrefe & Huber, Bern, p 83-Series.
Ref ID: 311

Abstract: English ABG: In zwei geographischen Regionen, die sich hinsichtlich der Frequenz von Tiefflugen von militaerischen Ueberschallgeschwindigkeitsflugzeugen unterschieden, wurde der Zusammenhang zwischen Fluglaerm und der Inzidenz kinder- und jugendpsychiatrischer Stoerungen untersucht. Daten wurden an Stichproben von insgesamt 1636 Kindern und Jugendlichen sowie 376 Eltern erhoben. Es konnte lediglich ein schwacher Zusammenhang zwischen Laerm und psychophysiologischen Parametern, etwa Herzrate und motorische Aktivitaet nachgewiesen werden. Die Bedeutung dieses Zusammenhangs liess sich jedoch auf der Basis der vorliegenden Befunde nicht eindeutig erklaren.

262. **Poustka,F, Schmeck,K** (1990): [Psychological effects of military low altitude flight practice on children] Uber die psychischen Auswirkungen von militarischer Tiefflugtatigkeit auf Kinder. *Z.Kinder.Jugendpsychiatr.* 18: 61-70.
Ref ID: 20

Abstract: In a 2-step epidemiological study child psychiatric disorders, psychophysiological reactions and psychosocial stressors of 376 children aged 4 to 16 were recorded in two regions of Westphalia (West-Germany) with different frequencies of military low-level flights. No essential impairment of the children's health was found. However, below a clinical level we noticed significantly higher anxiety syndromescores (and to some extent of depression syndromescores) and a tendency towards higher psychophysiological arousal in the high-noise area along with no differences in psychosocial stressors. Implications of these results and aspects of child-psychiatric assessment instruments' use are discussed

263. **Poustka,F, Schmeck,K** (1996): [Damaging health effects on children caused by low flying aircraft and other environmental stresses. Autonomic reactions and psychological symptoms in the developmental stage] Gesundheitsschaden bei Kindern durch Tieffluge und andere Umwelteinflusse. Vegetative Reaktionen und psychische Auffaelligkeiten im Entwicklungsalter. *Schriftenr.Ver.Wasser.Boden.Lufthyg.* 97: 1-171.
Ref ID: 9

264. **Preuss,S** (1989): Tiefflug ist Koerperverletzung Ueber die psychischen Auswirkungen des militaerischen Tiefflugs auf Kinder Low-level flight is bodily injury. On psychological effects of military low-level flight on children. *Paed.extra & Demokratische Erziehung* 2: 38-42.
Ref ID: 314

Abstract: German ABG: Die psychischen Auswirkungen des militaerischen Tiefflugs auf Kinder werden ueberblicksartig dargestellt. Dabei werden drei Auswirkungsformen differenziert: (1) primaere psychische Auswirkungen (akustische Situation einer psychophysiologischen Notfallreaktion mit massiver Beeintraehtigung der kognitiven Leistungsfaeahigkeit sowie des sozialen und kommunikativen Verhaltens und einer Desorganisation der Wahrnehmung, optische Situation, unvorhersehbare Aufttrittsart, Charakteristika der Reizquelle), (2) Dauerbelastung (chronischer Stress, mangelnde Adaptation), (3) sekundaere psychische Auswirkungen (Kontrollverlust, Signallernen, Erwartungsangst, Verifizierung der Bedrohung). Militaerischer Tiefflug wird als Koerperverletzung bezeichnet, und es wird fuer dessen sofortige Einstellung plaediert.

265. **Pulles,MPJ, Biesiot,W, Stewart,R** (1990a): Adverse effects of environmental noise on health: An interdisciplinary approach. *ENVIRON.INT.* 1990; 16: 437-445.
Ref ID: 199

Abstract: A model, including psychological constructs (e.g., coping and control), was developed to predict adverse health effects of environmental noise. To evaluate this model, a combined research strategy was adopted, including a questionnaire administered to about 2000 subjects, a medical examination of a subset of about 830 subjects, and a laboratory experiment with a subset of 24 subjects. The subjects were in every day life exposed to varying levels of military aircraft or road traffic noise. No significant relation between noise level and blood pressure was observed in this survey. Subjective health and annoyance related variables however showed a dependence upon the level of environmental noise. Subjects perceiving an internal locus of control reported fewer complaints compared to those perceiving an external locus of control. The difference, however, is idependent of the noise

- level. Subjects exhibiting a coping style based upon avoidance, showed a higher noise sensitivity compared to those with other coping styles
266. **Pulles,T, Biesiot,W, and Stewart,R.** Adverse effects of environmental noise on health: An interdisciplinary approach; Proceedings of the 5th international Congress on Noise as a Public Health Problem. Berglund, B. and Lindvall, T. (eds). 2. 1990. Stockholm, Sweden, Swedish Council for Building Research.
Ref Type: Conference Proceeding
Ref ID: 601
267. **Raw,GJ, Griffiths,ID** (1985): The effect of changes in aircraft noise exposure. *J.of Sound and Vibration* 101: 273-275.
Ref ID: 408
268. **Raymond,LW** (1991): Neuroendocrine, immunologic and gastrointestinal effects of noise. In Fay,T, editor. *Noise and Health*. New York: New York Academy of Medicine.
Ref ID: 594
269. **Reijneveld,SA** (1994): The impact of the Amsterdam aircraft disaster on reported annoyance by aircraft noise and on psychiatric disorders. *Int.J.Epidemiol.* 23: 333-340.
Ref ID: 61
- Abstract: On 4 October 1992 a plane crashed on the south- eastern (SE) borough of Amsterdam. This study examines the effects of this disaster on the reported annoyance caused by aircraft noise and on psychiatric disorders measured by the General Health Questionnaire (GHQ), in an ongoing Health Interview Survey (HIS). METHODS. In the HIS 5092 people were interviewed; 1006 before the accident and 305 in the SE borough. Odds ratios (OR) were computed comparing the period before the disaster with the 8 months thereafter. RESULTS. After aircraft crossings restarted (weeks 3-10 after the disaster) 60.0% of the respondents in the disaster borough reported annoyance, compared to 36.8% before the event (crude OR = 2.57, 95% confidence interval (CI); 2.63-3.04). In the three subsequent 2-month periods these OR for the SE borough steadily decreased. No significant change was found either for the rest of Amsterdam or for the GHQ measure. Logistic regression modelling showed the increase to be highest immediately after the aircraft crossings restarted. (OR = 7.50, 95% CI: 2.40-23.4). CONCLUSIONS. The results suggest that fear is related to a heightened sensitivity to noise, but indicate that this does not lead to widespread psychiatric disorders. The results further indicate that this HIS was sufficiently sensitive to show changes in annoyance caused by aircraft noise after such a severe incident
270. **Remschmidt,H, Schmidt,MH** (1992): *Developmental psychopathology Entwicklungspsychopathologie* : Hogrefe & Huber, Bern.
Ref ID: 328
- Abstract: English ABG: Inhalt (Uebersetzung): (A) Allgemeine Fragen und Methodik der Entwicklungspsychopathologie. (1) P. Graham und S. Skuse: Die Entwicklungsperspektive in der Klassifikation. (2) H.-C. Steinhausen: Geschlechtsunterschiede in der Entwicklungspsychopathologie. (3) H. Remschmidt: Die Interaktion biologischer und psychosozialer Einflüsse in der Entwicklungspsychopathologie. - (B) Entwicklungspsychopathologie bei kleinen Kindern. (4) A. Cox u.a.: Erfassung des psychischen Zustands bei dreijährigen Kindern. (5) C. Gillberg und I. C. Gillberg: Autismus: Neuere Entwicklungen. (6) D. Skuse, D. Wolke und S. Reilly: Wachstumsstörungen: Klinische und Entwicklungsaspekte. - (C) Entwicklungspsychopathologie bei Schulkindern. (7) G. Lehmkuhl, W. Thoma und H. Flechtner: Stabile und instabile neuropsychologische Funktionen in der kindlichen Entwicklung. (8) F. Poustka, P. Eckermann und K. Schmeck: Einfluss von Fluglärm und psychosozialen Stressoren auf psychische Störungen bei Kindern und Jugendlichen. Eine epidemiologische Studie im Raum Westfalen. (9) M. H. Schmidt und G. Esser: Minimale Hirnstörung - Fakt oder Fiktion? Eine Revision des MCD-Konzepts aus der Entwicklungsperspektive. (10) H. Remschmidt, R. Walter und K. Hennighausen: Minimale Hirnstörung. Untersuchung an einer fast vollständigen Population von Nutzern kinder- und jugendpsychiatrischer Dienste. (11) A. Warnke und H. Remschmidt: Visuelle Informationsverarbeitung bei entwicklungsbedingt legasthenischen Jungen. Eine neuropsychologische Studie. (12) H. van Engeland, P. Schothorst und H. Barneveld:

Neurologische und psychopathologische Folgen neonataler Intensivbehandlung nach 8 bis 10 Jahren. (13) F. C. Verhulst und H. M. Koot: Stabilität externalisierendes Verhaltens einer epidemiologischen Stichprobe. - (D) Jugendalter. (14) R. K. Silbereisen und H. T. Albrecht: Einfluss der Familie und von Gleichaltrigen auf die Selbstbeurteilung Jugendlicher. - Die Beiträge gehen auf ein Symposium zurück, das 1989 mit Unterstützung der "Stiftung Volkswagenwerk" in Marburg stattfand. (Buch/Jürgen Wiesenhuetter - ZPID) ABE: Contents: (A) General issues and methods in developmental psychopathology. (1) P. Graham and D. Skuse: The developmental perspective in classification. (2) H.-C. Steinhausen: Sex differences in developmental psychopathology. (3) H. Remschmidt: The interaction of biological and psychosocial influences in developmental psychopathology. - (B) Developmental psychopathology in young children. (4) A. Cox et al.: Assessment of mental state in 3-year-old children. (5) C. Gillberg and I. C. Gillberg: Autism: Recent developments. (6) D. Skuse, D. Wolke, and S. Reilly: Failure to thrive: Clinical and developmental aspects. - (C) Developmental psychopathology in school children. (7) G. Lehmkuhl, W. Thoma, and H. Flechtner: Stable and unstable neuropsychological functions during child development. (8) F. Poustka, P. Eckermann, and K. Schmeck: Effect of aircraft noise and psychosocial stressors on mental disturbances of children and adolescents: An epidemiological survey in Westphalia. (9) M. H. Schmidt and G. Esser: MBD - Fact or fiction: A revision of the minimal brain dysfunction concept from the developmental perspective. (10) H. Remschmidt, R. Walter, and K. Hennighausen: Minimal cerebral dysfunction - Revision of a clinical concept: Investigation of an almost complete population utilizing child and youth psychiatric services. (11) A. Warnke and H. Remschmidt: Visual information processing in developmentally dyslexic boys: A neuropsychological study. (12) H. van Engeland, P. Schothorst, and H. Barneveld: Neonatal intensive care unit patients followed up: Neurological and psychopathological outcome after 8-10 years. (13) F. C. Verhulst and H. M. Koot: The stability of externalizing behaviors in an epidemiological sample. - (D) Adolescence. (14) R. K. Silbereisen and H. T. Albrecht: Peer and family effects on adolescent self-evaluation. (Book/Jürgen Wiesenhuetter - ZPID)

developmental psychopathology; childhood neurosis & early infantile autism & failure to thrive & neuropsychological disorders & environmental stress reactions & minimal brain disorders & learning disorders & behavior disorders; preschool-age children & school-age children & adolescents; empirical studies; conference proceedings

271. **Ronnebaum,T, Schulte-Fortkamp,B, Weber,R** (1997): Evaluation of combined noise sources Evaluation kombinierter Geräuschquellen. In Schick,A, Klatt,M, editors. *Contributions to psychological acoustics. Results of the Seventh Oldenburg Symposium on Psychological Acoustics, Bibliotheks- und Informationssystem der Universität Oldenburg, Oldenburg, 1997, Seiten 171-189*. Bibliotheks- und Informationssystem der Universität Oldenburg, Oldenburg, pp 171-189.
Ref ID: 321

Abstract: English ABE: Reviews and analyzes more than 70 publications on how to study annoyance from multiple sources of noise. Dose-response relationships were compared for field and laboratory data. Whereas regression curves in field data revealed that aircraft noise was most annoying, followed by traffic and rail, there were hardly any differences in slopes in laboratory data indicating that all types of noise are equally annoying. It is concluded that results of these studies makes the suitability of laboratory data questionable. Finally, the predictions of numerous models of reactions to combined noises in the environment were tested against data from a German road and railway traffic survey. Best predictions were obtained with the dominant source model and the summation and inhibition model. perceived annoyance from multiple noise sources; dose-response relationships; field vs laboratory data; tests of model predictions; dominant source model & summation & inhibition model; overview and methodological study

272. **Rosenberg,J** (1991b): Jets over Labrador and Quebec: Noise effects on human health. *Can Med Assoc J* 144: 869-875.
Ref ID: 609
273. **Rosenberg,J** (1991a): Jets over Labrador and Quebec: noise effects on human health. *CMAJ*. 144: 869-875.
Ref ID: 42

- Abstract: To determine whether the noise from low-level flights over Labrador and Quebec is harmful to human health. DATA SOURCE AND SELECTION: Search of MEDLINE for articles on the effect of noise, particularly impulse noise associated with low-level flights, and a search of the references from identified articles. DATA SYNTHESIS: The noise levels from low-level flights could affect hearing acuity. However, the more important consequences appear to be stress-mediated physiologic effects, especially cardiovascular ones, and psychological distress, particularly in children. Subjective perception of control over the noise has been found to mitigate some physiologic effects. CONCLUSION: There is sufficient evidence to show that the noise from low-level flights is harmful to human health
274. **Rylander,R** (1999): Aircraft noise - a global pollutant. *J Aviation Environ Res* 3: 3-6.
Ref ID: 493
Abstract: short review: It is demonstrated that the number of overflights and the noise level are relatively independent factors influencing annoyance when the noise level is higher than 70dB. It is postulated that by lower intensities only the noise-level is relevant.
275. **Rylander,R, Björkman,M** (1988): Maximum noise levels as indicators of biological effects. *J.SOUND.VIBRAT.* 1988; 127: 555-563.
Ref ID: 232
Abstract: The biological response to noise is reviewed with reference to average stimulus levels integrated over time, maximum stimulus levels and the number of stimuli. It is concluded that the equal energy concept does not meet the requirement for a biological relevant model for noise exposure. Annoyance data from noise from aircraft, road traffic, trains and laboratory experiments is used to examine this hypothesis. It is concluded that the extent of annoyance due to noise dose is determined independently by the level from the noisiest events and the number of events up to certain saturation point, above which a further increase in number does not influence the annoyance. Further research work should be undertaken to identify this number of events for different environmental noises and to clarify how the maximum noise level should be defined, particularly for road traffic noise
276. **Rylander,R, Björkman,M** (1997): Annoyance by aircraft noise around small airports. *J Soun Vibr* 205: 533-537.
Ref ID: 496
277. **Rylander,R, Björkman,M, Ahrlin,U, Arntzen,E, Solberg,S** (1986): Dose-response relationships for traffic noise and annoyance. *Arch.Environ.Health* 41: 7-10.
Ref ID: 68
Abstract: The annoyance due to road traffic noise was studied in 18 areas in five countries. A total of 1379 interviews was performed and noise measurements were made in each area. The relation between Leq and the extent of the population expressing that they were "very annoyed" was poor ($r_{xy} = 0.03$). An augmentation of the number of heavy vehicles from 1000/24 hr up to greater than 3000/24 hr did not increase the extent of annoyance. The highest correlation was obtained for the maximum noise level. The dose-response relationship implies that the number of events above a certain limit will not increase the extent of annoyance: it is determined by the highest noise level from single vehicles. It is suggested that this model for the human reaction to environmental noise, which has now been demonstrated for aircraft, train, and traffic noise, should be considered for the establishment of standards
278. **Schell,LM** (1981): Environmental noise and human prenatal growth. *Am.J.Phys.Anthropol.* 56: 63-70.
Ref ID: 343
Abstract: To determine whether chronic exposure to relatively loud noise has demonstrable biological effects in humans, a study was conducted on the effect of mother's exposure to airport noise while pregnant, and of social and biological characteristics of the family upon birthweight and gestation length. The sample of births was drawn from a community located adjacent to an international airport in the U.S., where noise levels had been measured previously. Mother's noise exposure was based upon noise levels near her residence in the community while she was pregnant. Data from 115 births were used, these being from mothers whose noise exposure history was most complete throughout the pregnancy. Using

multivariate analysis to correct for family characteristics, the partial correlation coefficient for noise exposure and gestation length was negative, large, and significant in girls ($r = -0.49$, p less than 0.001). In boys the partial correlation coefficient was also negative but was smaller and did not quite reach statistical significance. Partial correlations with birthweight were smaller in both boys and girls and not significant. These results agree best with previous studies that suggest that noise may reduce prenatal growth. The size of the observed effects may be related to a conservative research design biased towards underestimation, as well as to the real effects of noise upon human prenatal growth

279. **Schell,LM** (1991): Effects of pollutants on human prenatal and postnatal growth: Noise, lead, polychlorobiphenyl compounds, and toxic wastes. *Am.J.Phys.Anthropol.* Suppl 13: 157-188.
Ref ID: 8

Abstract: Industrialization is a major force altering the environment for human habitation. Pollution from industrialization may pose new adaptive challenges for *Homo sapiens* as well as for other species. The study of human biological adaptation is a traditional area of physical anthropology, but until recently it has not focused on the adaptive challenges of the modern anthropogenic environment. By combining research from anthropology, epidemiology, and public health, it is possible to gauge some of the effects of pollution on human health and adaptation. This review focuses on human growth as a measure of health and a component of human adaptability. Considerable evidence now exists for an adverse impact of lead, noise, and polychlorinated biphenyls on human growth, either prenatal, postnatal, or both. There is substantial replication of results among studies, many of which differ in exposure assessment and classification, sample composition and size, and statistical techniques. Because of this among study variation, specifying the exact amount of growth retardation due to a pollutant is difficult, but the direction and often the magnitude of the effect is similar across studies. There remain numerous barriers to more definitive research on environmental pollutants and health outcomes of importance to biological anthropologists. These are discussed also lead;

280. **Schell,LM, Ando,Y** (1991): Postnatal growth of children in relation to noise from Osaka international airport. *J Sound Vibr* 151: 173-182.
Ref ID: 446

Abstract: Gewicht und Größe von 6686 drei Jahre alten Knaben und Mädchen, die in der Nähe von Osaka airport wohnen werde analysiert Die Kinder wurden in fünf Gruppen mit unterschiedlicher Fluglärmexposition unterteilt. Zusammenhänge mit Gewicht, nicht aber mit Größe wurden gefunden.

281. **Schell,LM, Hodges,DC** (1985): Longitudinal study of growth status and airport noise exposure. *Am.J.Phys.Anthropol.* 66: 383-389.
Ref ID: 69

Abstract: A study of children living adjacent to an international airport was conducted to learn whether noise exposure affected physical growth. Prenatal and postnatal noise exposures were estimated for each subject based on noise levels at their residences during jetplane takeoffs. Subjects' birthweights were standardized for sex and parity, and their postnatal heights and weights were standardized for sex and age (range 6-11 years). The difference between standardized birthweight score and postnatal height score, and between birthweight score and postnatal weight score, represent a change in growth status of a more or less permanent nature, respectively. After adjusting for confounding factors, children from the exposed community ($n = 103$) had a significantly smaller mean of status change by height (p less than 0.05), and a somewhat smaller mean of status change by weight (0.10 less than p less than 0.05) in comparison to children from an unexposed community ($n = 94$). A dose-response curve was then expected in the exposed community. However, in multiple regression analyses of the exposed children, noise exposure was not related to either change in growth status variable. This second result is inconsistent with the differences between communities and suggest that they are a result of factors other than noise exposure. We conclude that the moderate to severe noise levels of the areas surrounding most subjects' homes did not adversely affect postnatal growth. Further studies of noise and growth should concentrate observations on people exposed to even more severe noise levels than those experienced by most subjects in this study

282. **Schell,LM, Norelli,RJ** (1983): Airport noise exposure and the postnatal growth of children. *Am.J.Phys.Anthropol.* 61: 473-482.
Ref ID: 342
- Abstract: To determine whether chronic exposure to airport noise affects children, a study was conducted of the physical growth of children, aged 5-13 years, from two communities, one exposed to airport noise (n = 148) and another, not exposed (n = 102). Ten standard anthropometric measurements were made according to U.S. Health Examination Survey guidelines, and information on the social and biological characteristics of each family was collected in interviews. Hotelling's T2-tests were performed comparing the noise-exposed and nonnoise-exposed samples. There was no significant difference between the sample for measurements of social and biological characteristics of the families (including socioeconomic status and maternal reproductive history). Parental anthropometrics differed significantly (T2 = 24.32, P = 0.0001) as did child anthropometrics (T2 = 21.01, P = 0.032). For the child anthropometrics, noise-exposed children's slightly smaller measures of body bulk, together with their larger facial breadths, contributed to the significant T2. When the entire sample (n = 250) was analyzed by multiple linear regression, noise exposure was a significant predictor only of male triceps and subscapular skinfolds. For these two variables, and most other anthropometrics, however, the beta coefficients were negative for both sexes. In order to include information on the covariance structure among all variables, a canonical correlation analysis was performed. Noise exposure loaded negatively on the third canonical variate and was paired with positively loaded measures of body bulk. Taken together, the three analyses suggest that while there is some evidence for a slight effect of airport noise on measures of body bulk for males in this sample, most measures of postnatal growth for both males and females were unaffected by the noise levels experienced
283. **Schick,A** (1992b): Current problems of noise research. *HNO* 1992; 40: 37-40.
Ref ID: 265
284. **Schick,A** (1992c): Lärmforschung aus der Sicht der Psychologie. *Z.Lärbekämpfung* 39: 113-117.
Ref ID: 599
285. **Schick,A** (1992a): The psychological aspects of noise research. *Z.Lärbekämpfung.* 1992; 39: 113-117.
Ref ID: 191
286. **Schick,A, Klatte,M** (1997): *Contributions to psychological acoustics Results of the seventh Oldenburg symposium on psychological acoustics Beitrage zur psychologischen Akustikforschung. Ergebnisse des 7. Oldenburger Symposiums* : Bibliotheks- und Informationssystem der Universitaet Oldenburg, Oldenburg.
Ref ID: 306
- Abstract: Contents: (1) M. Cheatham: Cochlear nonlinearities: A view from the inner hair cell. (2) M. Granzow et al: Linear phase filtering of early auditory evoked potentials. (3) E. Schroeger et al: Processing of interaural cues used for auditory lateralization. (4) G. Langner: Temporal and spatial representation of spectral and pitch information. (5) M. Mauermann et al: On the source of DPOEAE fine structure and it's relation to other types of otoacoustic emissions. (6) O. Wegner et al: Auditory brainstem responses with optimized chirp signals compensating basilar membrane dispersion. (7) N. Springer et al: Instantaneous and overall loudness of temporally variable pink noise. (8) J. Vogt et al: The relative impact of aircraft noise and number. (9) H. Prante: Predicting categorical judgments of sounds. (10) S. Kuwano et al: Evaluation of the impression of danger signals. (11) N. Chouard et al: On the unpleasantness of dichotic noise signals. (12) A. Tamura: Effects of landscaping on the feeling of annoyance of a space. (13) K. Zimmer et al: Construction and evaluation of a noise-sensitivity questionnaire. (14) T. Ronnebaum et al: Evaluation of combined noise sources. (15) A. Preis: Environmental approach to noise. (16) K. Kuno et al: Analysis and prediction of personal reaction to environmental noise. (17) J. Kragh: Assessment of various kinds of environmental noise occurring at the same time. (18) R. Guski: Interference of activities and annoyance by noise from different sources. (19) S. Isabelle et al: Effects of uncertainty and masking on sound localization. (20) C. Zerbs: Simulations of binaural masked thresholds in dichotic noise maskers. (21) J. Yang et al: Sound pressure control

compensating for head movement of listeners. (22) K. Crispian et al: A spatial auditory environment for hierarchical navigation in non-visual interaction. (23) E. Mynatt: Transforming graphical interfaces into auditory interfaces for blind users. (24) A. Edwards: Using sounds to convey complex information. (25) A. Hellmann: Perception of moving sound sources. (26) V. Mueller: Additive-multiplicative relationships in the perception of simple and complex auditory stimuli. (27) R. Derleth et al: Simulation of modulation matching experiences with unilateral sensorineural hearing impaired listeners. (28) J. Verhey et al: Modeling comodulation masking release. (29) H. Gockel et al: On the detection of inharmonicity in complex tones. (30) W. Ellermeier et al: Perceptual contrast enhancement in profile analysis tasks. (31) Y. Suzuki et al: Sound quality of steady harmonic complex tones. (32) K. Ozawa et al: Phase effects on masked thresholds of pure tones. (33) G. Stuart: Processing similarities in the identification of verbal and non-verbal stimuli. (34) K. Krumbholz et al: Temporal processing of very brief sounds. (35) S. Namba et al: Temporal factors of hearing in noise research. (36) S. Hygge: The effects of different noise sources and noise levels on long-term memory in children aged 12-14 years. (37) D. Jones et al: Acoustic and organizational factors in the processing of irrelevant sound. (38) S. Tremblay: Is there a relationship between habituation to the irrelevant sound effects and the spectral complexity of auditory items? (39) M. Klatte et al: Effects of irrelevant speech on serial recall of verbal and spatial materials. (40) F. Mueller et al: Changing strategy with changing state? (41) C. Bonnet: Interindividual variability of training in psychophysical tasks. (42) B. Moore: Psychoacoustic consequences of compression in the peripheral auditory system. (43) M. Stone et al: A real-time DSP-based loudness meter. (44) T. Brand et al: Adaptive categorical loudness scaling. (45) M. Hansen et al: On the relative importance of individual critical bands for the perception of speech quality. (46) M. Marzinzik et al: Evaluation of different multi-channel dynamic compression algorithms with regard to recruitment compensation, quality and speech intelligibility.

287. **Schmeck, K** (1992): *Beeinträchtigung von Kindern durch Fluglärm Auswirkungen von militärischem Tieffluglärm auf psychophysiologische Reaktionen von Kindern und Jugendlichen. Ergebnisse einer Felduntersuchung in Westfalen Harmful effects of aircraft noise on children. Effects of noise from low-altitude military flights on psychophysiological reactions in children and adolescents. Results of a field study in Westphalia (Germany)* : Klotz, Eschborn.

Ref ID: 329

Abstract: German ABG: Vorgelegt werden empirische Befunde einer Untersuchung zu den gesundheitlichen Beeinträchtigung von Kindern und Jugendlichen in Gebieten mit unterschiedlichen militärischen Tiefflugaktivitäten. Bei 1622 Vier- bis Sechzehnjährigen aus sieben westfälischen Gemeinden mit unterschiedlicher Tieffluglärmbelastung (Fragebogenrücklauf von 54 Prozent) wurde zunächst die somatische Symptombelastung mit der "Child Behavior Check List" (CBCL) erhoben. Bei 136 nach dem CBCL-Wert unauffälligen und 240 nach dem CBCL-Wert auffälligen Kindern und Jugendlichen wurden dann psychophysiologische Untersuchungen der Herzfrequenz, Muskelspannung, Hautleitfähigkeit und motorischen Aktivität während einer Intelligenztestung (Grundintelligenztest CFT-1 beziehungsweise CFT-20), drei Blutdruckmessungen, eine kurze neurologische Untersuchung und ein kinderpsychiatrisches Interview (Diagnostic Interview Schedule for Children) durchgeführt. Zusätzlich wurden die subjektive Fluglärmbelastung bei den Kindern, ihre psychosoziale Hintergrundbelastung bei den Eltern (modifizierte Form des "Mannheimer Eltern-Interviews") und die objektive Lärmbelastung mit Hilfe von Dauermessstationen erfasst. Die Befunddarstellung bezieht sich auf (1) die objektive Lärmbelastung, (2) die subjektive Wahrnehmung der Flughäufigkeit, das subjektive Gestoertsein und das Gefühl der Bedrohung durch Tiefflieger, (3) die Entwicklungsabhängigkeit der psychophysiologischen Messwerte, (4) Vergleiche zwischen den sieben Orten und zwischen den nach der Fluglärmbelastung bestimmten Extremgebieten, (5) die relative Bedeutsamkeit der Lärmbelastung fuer Unterschiede in den psychophysiologischen Funktionen sowie (6) die somatischen Beschwerden. Die Ergebnisse weisen auf deutliche Unterschiede in den psychophysiologischen Funktionen der Kinder und Jugendlichen aus den unterschiedlich durch Fluglärm belasteten Regionen. Der bedeutsamste Indikator fuer die Lärmbelastung scheint nicht die Flughäufigkeit, sondern die Höhe der Pegelanstiegsgeschwindigkeit zu sein. Es zeigte sich auch, dass die körperlichen Reaktionen der Kinder im psychophysiologischen Bereich weitgehend von der subjektiv erlebten Belastung unabhängig sind. (Guenter Krampen - ZPID) ABE: Investigated

possible health impairments in children and adolescents in areas with different levels of low-altitude military flights. Somatic symptoms in 1,622 4- to 16-year-olds from seven communities in Westphalia, Germany, were assessed with the help of the Child Behavior Check List (CBCL). The return rate of the questionnaires was 54 percent. For 136 of the children and adolescents classified according to their CBCL score as nonsymptomatic and 240 as symptomatic, psychophysiological examinations (heart rate, muscle tension, skin conductance and motor activity while they took an intelligence test), three blood pressure measurements, a short neurological examination and a child psychiatric interview (Diagnostic Interview Schedule for Children) were carried out. In addition, subjective stress of aircraft noise was assessed in the children, parents were asked about their children's psychosocial background stress using a modified form of the Mannheimer Eltern-Interview, a parental interview form, and the objective noise stress was assessed with data from long-standing measurement stations. The results are summarized with respect to (1) objective stress due to noise; (2) subjective perception of flight frequency, subjective disturbance and the feeling of being threatened by low-altitude flights; (3) the dependency of psychophysiological findings on development; (4) comparisons between the seven regions and between certain extreme areas (low versus high noise); (5) the relative impact of noise stress for differences in psychophysiological functions; and (6) somatic complaints. The results show significant differences in psychophysiological functions of children and adolescents in regions differing in aircraft noise. The most important indicator of noise stress seems not to be flight frequency but the size of the gauge acceleration rate. It was also found that the children's physical reactions in the psychophysiological area were largely independent of subjective stress. (Martha Keating - ZPID)

noise effects of military low-altitude flights; psychophysiological reactions & health of children & adolescents; noise effects & environmental stress & well-being; childhood development & adolescent development; CBCL & CFT-1 & CFT-20 & DISC & MEI; 1,622 children & adolescents; empirical study

288. **Schmeck,K** (1994): Krach in der Umwelt - Krach in der Familie Zur relativen Bedeutsamkeit von oekologischen und psychosozialen Faktoren fuer das psychische und psychosomatische Befinden von Kindern und Jugendlichen Relevance of ecological and psychosocial factors for mental and psychosomatic well-being in children and adolescents. *Verhaltenstherapie und psychosoziale Praxis* 26: 159-172.

Ref ID: 308

Abstract: Anhand des Beispiels "Auswirkungen des militaerischen Tiefflugbetriebs" werden die komplexen Wechselwirkungen von physikalischen und psychosozialen Stressoren auf das psychische und somatische Befinden von Kindern und Jugendlichen dargestellt. Eine Untersuchung von 376 Kindern und Jugendlichen mit hohen bzw. niedrigen Auffaelligkeitswerten in der "Child Behavior Checklist" und ihren Familien machte deutlich, dass Tieffluglaerm zu massiver Belaestigung und Bedrohtheitsgefuehlen, vermehrten Aengsten und einer erhoekten autonomen Aktivierung fuehrte. Beziehungen zu manifesten psychischen oder somatischen Erkrankungen waren fuer den physikalischen Stressor Laerm jedoch nicht nachweisbar. Dagegen zeigten psychosoziale Risikofaktoren einen engen Zusammenhang zum psychischen und psychosomatischen Befinden der Kinder und Jugendlichen.

289. **Schmeck,K, Poustka,F** (1993b): Psychiatric and psychophysiological disorders in children living in a military jetfighter training area. In Vallet,M, editor. *Noise and Man 93: Proceedings of the 6th International Congress of noise as a public health problem*. Arcueil Cedex, France: INRETS, p Vol 2: 477-480.

Ref ID: 431

290. **Schmeck,K, Poustka,F** (1993a): Psychophysiological and psychiatric tests with children and adolescents in a low-altitude flight region. *Schriftenr. Ver. Wasser.Boden.Lufthyg.* 88: 288-306.

Ref ID: 17

291. **Schmeck,K, Poustka,F** (1994): Erwiderung auf die Kritik von R. Sponzel Reply to R. Sponzel's criticism. *Zeitschrift fuer Kinder- und Jugendpsychiatrie* 22: 218-221.

Ref ID: 310

- Abstract: German ABG: In einer Stellungnahme zur Kritik von R. Sponsel (im gleichen Heft) an einer Untersuchung der Autoren ueber psychische Auswirkungen militaerischer Tiefflugtaetigkeit auf Kinder (in Zeitschrift fuer Kinder- und Jugendpsychiatrie 1990, 18 (2)) werden die inhaltlichen und methodischen Kritikpunkte entkraeftet. (Ute R. Wahner - ZPID)
292. **Schomer,PD, Averbuch,A** (1989): Indoor human response to blast sounds that generate rattles. *J.Acoust.Soc.Am.* 86: 665-673.
Ref ID: 71
- Abstract: The two major noise sources that cause environmental problems for the U. S. Army are helicopters and large weapons such as artillery, tanks, and demolition. These large weapons produce blast sounds that contain little energy above 200 Hz and that are particularly troublesome to deal with because they excite rattles in structures. The purpose of this study was to systematically test subjective response to the presence or absence of rattles in otherwise similar blast sound environments. A second purpose of the study was to test if there were structural changes that could reduce annoyance within the indoor blast sound environment. This study was done using a specially constructed test house and highly repeatable shake table to generate the blast sounds. The data clearly show that no commonly used environmental noise measure adequately describes the indoor environment when the blast excites rattles. Although the indoor blast ASEL changes by only about a decibel or so (and the indoor blast CSEL changes by even less), the subjective response changes by up to 13 dB. At low blast levels, the increase in human annoyance response is largest, and this annoyance response offset decreases to about 6 dB when the outside, flat-weighted peak sound-pressure level of the blast increases from 112 to 122 dB
293. **Schomer,PD and Hoover,BD.** A-weighting - it does not work indoors for helicopter or large gun-noises; noises with low frequencies and large amplitudes. Proceedings of the Int.Conference on Noise Control Engineering, Newport Beach,CA. 2, 853-858. 1989. Poughkeepsie,NY, Noise Control Foundation.
Ref Type: Conference Proceeding
Ref ID: 409
294. **Schuemer,R, Schuemer-Kohrs,A** (1991): Laestigkeit von Schienenverkehrs-laerm im Vergleich zu anderen Laermquellen Ueberblick ueber Forschungsergebnisse Comparison of the annoyance due to railway noise and due to noise from other sources - A review of the literature. *Zeitschrift fuer Laermbekaempfung* 38: 1-9.
Ref ID: 330
- Abstract: Journal-Article (10); Literature-Review (11)
German ABG: Es wird ueber Untersuchungsergebnisse in- und auslaendischer Feldstudien zur Laestigkeit von Schienenverkehrs-laerm im Vergleich zu anderen Laermquellen berichtet. Den Schwerpunkt bildet der Vergleich des Schienenverkehrs-laerms mit dem Strassenverkehrs-laerm. Es wird aufgezeigt, dass bei gleichen Mittelungspegeln Schienenverkehrs-laerm in den meisten Gestoerheitsbereichen weniger laestig wirkt als Strassenverkehrs-laerm (Schienenbonus). Dieser Laestigkeitsunterschied zugunsten der Schiene ist bei den Nachtstoerungen deutlicher als bei den Tagstoerungen. Bei den Tagstoerungen findet sich ebenfalls ein Bonus bei der Mehrzahl der Gestoerheitsbereiche; hingegen liegt bei den Kommunikationsstoerungen ein Schienenmalus vor (groessere Laestigkeit von Schienen- als von Strassenverkehrs-laerm). Auch im Vergleich zu Fluglaerm oder Industrielaerm erwies sich Schienenverkehrs-laerm als weniger laestig. (Zeitschrift/Jutta Rohlmann - ZPID)
annoyance caused by railway noise in comparison to road traffic noise & aircraft noise & industrial noise; results of field studies; literature review
295. **Schuller,WM and van der Ploeg,FD.** A new noise metric system for aircraft noise near airports based on sleep disturbances Proceedings: Inter-noise 92. 1007-1010. 1992. Toronto.
Ref Type: Conference Proceeding
Ref ID: 556
296. **Schultz,TJ.** Synthesis of social surveys on noise annoyance. *J.Acoust.Soc.Am.* 72, 377-405. 1978.

- Ref Type: Journal (Full)
Ref ID: 43
297. **Schwarze,S and Thompson,SJ.** Research on non-auditory physiological effects of noise since 1988: review and perspectives. Proceedings of the 6th International congress on noise as a public health problem. Vallet, M. (ed). [3], 252-259. 1999. Arcueil, Cedex, France, INRETS.
Ref Type: Conference Proceeding
Ref ID: 478
Abstract: Sonderdruck vorhanden (Buch)
298. **Sgoutas Emch,SA, Cacioppo,JT, Uchino,BN, Malarkey,W, Pearl,D, Kiecolt Glaser,JK et al** (1994): The effects of an acute psychological stressor on cardiovascular, endocrine, and cellular immune response: a prospective study of individuals high and low in heart rate reactivity. *Psychophysiology* 31: 264-271.
Ref ID: 513
Abstract: High and low reactors were preselected on the basis of their heart rate reactivity to a speech stressor in a prescreening session. In the main study, subjects were exposed to a mental arithmetic plus noise stressor. Cardiovascular activity was recorded during baseline and stressor, and blood was drawn prior to and following the stressor for endocrine and immune assays. Results revealed that the stressor decreased the blastogenic response to concanavalin A and increased natural killer cell numbers and cytotoxicity, absolute numbers of CD8+ T-lymphocytes, norepinephrine and epinephrine levels, heart rate, and blood pressure responses. In addition, cortisol and natural killer cell cytotoxicity responses to the stressor differentiated individuals high versus low in heart rate reactivity. These results suggest that the interactions among the autonomic nervous system, endocrine system, and immune system are not only amenable to psychophysiological analysis but that such analyses may play an important role in illuminating underlying mechanisms
299. **Shepherd,WT** (1987): Annoyance characterization by noise metrics. *Dev.Toxicol.Environ.Sci.* 15: 271-280.
Ref ID: 74
300. **Sieber,WJ, Rodin,J, Larson,L, Ortega,S, Cummings,N, Levy,S et al** (1992): Modulation of human natural killer cell activity by exposure to uncontrollable stress. *Brain Behav.Immun.* 6: 141-156.
Ref ID: 516
Abstract: Changes in natural killer cell (NK) activity and proportions of circulating T and NK lymphocyte subsets were assessed in adult males immediately after exposure to controllable or uncontrollable stress (noise) as well as 24 and 72 h later, in order to track the time course of the effects of stress. The role of control-relevant personality variables as moderators of the stress-immunosuppression relationship was considered. Subjects who perceived they had control over the noise as well as no-noise "control" subjects showed no reduction in NK activity. By contrast, subjects who perceived that they had no control over the stressor showed reduced NK activity immediately after the conclusion of the first 20-min stress session, and the reduced NK activity was found as long as 72 h later. Optimism and one's desire to be in control enhanced the negative impact of uncontrollable noise on NK activity. No differences between conditions were found on number of NK cells or a variety of T cell subsets. The results suggest the importance of perceived control in moderating the short- and long-term effects of stress on NK activity
301. **Smith,AP, Stansfeld,SA** (1986): Aircraft noise exposure, noise sensitivity and everyday errors. *Environ Behavior* 18: 214-226.
Ref ID: 491
302. **Sobrian,SK, Vaughn,VT, Ashe,WK, Markovic,B, Djuric,V, Jankovic,BD** (1997): Gestational exposure to loud noise alters the development and postnatal responsiveness of humoral and cellular components of the immune system in offspring. *Environmental.Research.* 73: 227-241.
Ref ID: 521

Abstract: Gestational exposure of the female to environmental toxins can alter immune function in the offspring. We have recently shown that prenatal maternal stress, that is, stress applied to or induced in the female during pregnancy, can also alter the development of humoral immunocompetence in the offspring and their hormonal and immunologic responses to postnatal stress. This report presents data from two experiments on the effects of prenatal exposure to loud noise-prenatal sound stress (PSS)-on the development and responsiveness of in vitro and in vivo humoral and cellular immune function in the offspring. Pregnant rats were exposed daily from Day 15 to Day 21 of gestation to an inescapable loud noise (an 85- to 90-decibel fire alarm bell) delivered randomly for 1 hr. In developing offspring, PSS produced age-dependent and mitogen-specific alterations in lymphoproliferative activity and reduced immunoglobulin G levels at Postnatal Day 21. Antibody titers to herpes simplex virus type 1 were also reduced. Exposure to loud noise before or after infection produced an additional reduction in titers in these offspring. Arthus skin reaction (AR) to old tuberculin was reduced by PSS. Combined prenatal/postnatal sound stress further reduced this response and the AR to bovine serum albumin (BSA). Delayed hypersensitivity reaction to BSA was reduced in PSS offspring; postnatal sound stress enhanced the reaction to both antigens, but only in males. Antibody titers to BSA were increased by PSS; adjuvant-induced inflammation was attenuated by postnatal sound stress. These data suggest that in utero exposure to loud noise, which can occur in the workplace, is toxic to the developing immune system

303. **Spehner,V, De-Wazieres,B, Nicod,L, HarragaS, Robert,JF, Seilles,E** (1996): Auditory stress induces changes in membrane functions of mouse peritoneal macrophages. *Scand.J.Immunol.* 44: 643-647.

Ref ID: 520

Abstract: Faculty of Medicine and Pharmacy, University of Franche- Comte, Besancon, France AB: Stressful events induce responses in the endocrine and immune systems. The authors analysed the influence of repetitive noise stress on peritoneal macrophage oxidative and phagocytic responses. Plasma corticosterone levels were also measured. Different groups of 6- to 8-week-old C57BL/6 male mice were exposed for 1 night (n = 14) and 3 nights (n = 21) to a sound stress of 110 dB in an audiogenic stress chamber. Control animals were submitted to a sham stress for 1 night (n = 13) and 3 nights (n = 17). A marked decrease was observed in the phagocytic response to yeast ($P = 3 \times 10^{-4}$) while a mild increase in the oxidative response stimulated by opsonized zymosan was noted only after the 3 night stress ($P = 0.02$). Corticosterone levels of control and stressed mice did not differ. These results indicate that the stress resulting from repetitive noise causes modifications in peritoneal macrophage activity, and that these changes are dependent on the duration of stress. These functional alterations seem more complex than a simple general suppression or activation RN: 50-22-6 (Corticosterone)

304. **Sponsel,R** (1994a): [Medical and statistical wonders in research of low flying aircraft noise? Critique of the F. Poustka and K. Schmeck study] *Medizinische und statistische Wunder in der Tieffluglarmforschung? Kritik an der Studie von F. Poustka und K. Schmeck. Z.Kinder.Jugendpsychiatr.* 22: 214-217.

Ref ID: 33

305. **Sponsel,R** (1994b): *Medizinische und statistische Wunder in der Tieffluglaermforschung? Kritik an der Studie von F. Poustka und K. Schmeck* Criticism of F. Poustka and K. Schmeck's study on medical and statistical miracles in research on low-altitude flight noise. *Zeitschrift fuer Kinder- und Jugendpsychiatrie* 22: 214-217.

Ref ID: 309

Abstract: Die von Poustka und Schmeck durchgefuehrte Studie ueber die psychischen Auswirkungen von militaerischer Tiefflugtaetigkeit auf Kinder (in Zeitschrift fuer Kinder- und Jugendpsychiatrie 1990, 18 (2)) wird kritisch kommentiert. Es wird darauf hingewiesen, dass der Befund der Autoren, unter den 1622 untersuchten Familien mit Kindern sei kein einziges mit Krankheitswert, bei einer geschaezten Krankheitsrate von fuenf Prozent so unwahrscheinlich ist, dass er als statistisches und medizinisches Wunder betrachtet wird. Erklarbar wird er durch das Vorgehen der Autoren, zwar Symptome und Syndrome zu erkennen, aber alle als "unterhalb der Schwelle einer klinisch bedeutsamen Stoerung" zu bewerten. Damit wird das schwierige differentialdiagnostische Problem umgangen, welche Stoerungen als tieffluglaermbedingt zu betrachten sind, was eigentlich zu erforschen

gewesen waere. Der Schaden fuer die betroffenen Kinder und ihre Familien ist gross: Ihr Leid bleibt unbeachtet und ihr Recht auf Entschaedigung wird ignoriert.

306. **Spreng,M.** Effects of noise from military low-level flights on humans. Proceedings of the 5th International Congress on Noise as a Public Health Problem. Berglund, B. and Lindvall, Th. (eds). 1, 293-303. 1990. Stockholm, Swedisch Council of Building Research.

Ref Type: Conference Proceeding

Ref ID: 608

307. **Spreng,M** (1993): Specific features of military low-altitude flight noise: criteria for risk of damage and physiological effects. *Schriftenr. Ver. Wasser.Boden.Lufthyg.* 88: 271-287.

Ref ID: 18

Abstract: The impact of sound from military low-altitude flying (75 m) is characterized by high maximum levels of up to 125 dB, a rapid rise in sound pressure level (steepest 10-dB slope up to 111 dB/s, mean value 36 dB/s), and occasional (30%) follow-up oscillations of up to around 100 dB. The energy within this broadband sound is very often concentrated primarily in the 0.8 to 4 kHz range. A criterion for the risk of damage can be applied using constant-frequency spectral dose analysis in order to establish, for example, how many overflight events might be regarded as tolerable. We can also draw on findings from animal experiments revealing damage to the extremely sensitive stereocilia of the hair cells in the inner ear to derive a risk assessment which shows that slight impairment to hearing is possible in low- altitude flight zones given either the recorded mean frequency of 17 direct overflights a day (with maximum levels over 100 dB) or else a few extreme isolated events. In laboratory experiments involving exposure to this type of highly dynamic low-altitude flight noise, short-term increases in heart rate (up to 21 beats/min) were found to be much greater than those provoked by other forms of environmental noise with comparable maximum levels (pile driving, gunfire)

308. **Spreng,M, Leupold,S, and Emmert,B.** Mögliche Gehörschäden durch Tieffluglärm. 1988. Berlin, Umweltforschungsplan des Bundesministeriums für Umwelt,Naturschutz und Reaktorsicherheit,Lärmbekämpfung.

Ref Type: Report

Ref ID: 613

309. **Staatsen,BA, Franssen,EA, and Lebret,E.** Health Impact Assessment Schiphol Airport: executive summary. RIVM Report Nr. 441520003. 1994. Bilthoven, the Netherlands, RIVM, National Institute of Public Health and Environmental Protection.

Ref Type: Report

Ref ID: 443

Abstract: This report describes the health impact of environmental pollution originating from activities around Schiphol National Airport, the Netherlands approaches have been applied for this Health impact assessment. One was based on combining estimated pollutant exposure levels in the Schiphol study area with exposure/response relations derived from the literature: risk evaluation. The second approach consisted in a geographical study on a small area scale using hospital admission rates for several respiratory and cardiovascular diseases. Thirdly a survey on risk perception and annoyance has been conducted in a sample of the population in the Schiphol area and the general Dutch population. In addition a subgroup of the Schiphol population was interviewed.

Short communication.

310. **Stansfeld,SA** (1992): Noise, noise sensitivity and psychiatric disorder: epidemiological and psychophysiological studies. *Psychol.Med.Monogr.Suppl.* 22: 1-44.

Ref ID: 39

Abstract: Noise, a prototypical environmental stressor, has clear health effects in causing hearing loss but other health effects are less evident. Noise exposure may lead to minor emotional symptoms but the evidence of elevated levels of aircraft noise leading to psychiatric hospital admissions and psychiatric disorder in the community is contradictory. Despite this there are well documented associations between noise exposure and changes in performance, sleep disturbance and emotional reactions such as annoyance. Moreover, annoyance is associated with both environmental noise level and psychological and physical

symptoms, psychiatric disorder and use of health services. It seems likely that existing psychiatric disorder contributes to high levels of annoyance. However, there is also the possibility that tendency to annoyance may be a risk factor for psychiatric morbidity. Although noise level explains a significant proportion of the variance in annoyance, the other major factor, confirmed in many studies, is subjective sensitivity to noise. Noise sensitivity is also related to psychiatric disorder. The evidence for noise sensitivity being a risk factor for psychiatric disorder would be greater if it were a stable personality characteristic, and preceded psychiatric morbidity. The stability of noise sensitivity and whether it is merely secondary to psychiatric disorder or is a risk factor for psychiatric disorder as well as annoyance is examined in two studies in this monograph: a six- year follow-up of a group of highly noise sensitive and low noise sensitive women; and a longitudinal study of depressed patients and matched control subjects examining changes in noise sensitivity with recovery from depression. A further dimension of noise effects concerns the impact of noise on the autonomic nervous system. Most physiological responses to noise habituate rapidly but in some people physiological responses persist. It is not clear whether this sub-sample is also subjectively sensitive to noise and whether failure to habituate to environmental noise may also represent a biological indicator of vulnerability to psychiatric disorder. In these studies noise sensitivity was found to be moderately stable and associated with current psychiatric disorder and a disposition to negative affectivity. Noise sensitivity levels did fall with recovery from depression but still remained high, suggesting an underlying high level of noise sensitivity. Noise sensitivity was related to higher tonic skin conductance and heart rate and greater defence/startle responses during noise exposure in the laboratory. Noise sensitive people attend more to noises, discriminate more between noises, find noises more threatening and out of their control, and react to, and adapt to noises more slowly than less noise sensitive people.(ABSTRACT TRUNCATED AT 400 WORDS) JOURNAL-ARTICLE 1994134875 199405

311. **Stansfeld,SA, Clark,CR, Turpin,G, Jenkins,LM, Tarnopolsky,A** (1985): Sensitivity to noise in a community sample: II. Measurement of psychophysiological indices. *Psychol.Med.* 15: 255-263.
Ref ID: 22
- Abstract: A sample of 77 women of high and low noise sensitivity in 1977, living in areas of high and low exposure to aircraft noise, were interviewed in the community in 1980. High, intermediate and low noise sensitive women were compared, using measures of blood pressure, heart rate, skin conductance, hearing threshold, uncomfortable loudness level and magnitude estimation of six tones. These physiological measures did not clearly distinguish different noise sensitivity groups, except that highly noise sensitive women had a consistently slower heart rate. Noise sensitivity was not related to auditory threshold. In the high aircraft noise area there were significantly more skin conductance responses than in the low aircraft noise area irrespective of noise sensitivity. This may be the result of chronic exposure to high aircraft noise
312. **Stansfeld,SA, Gallacher,J, Babisch,W, Shipley.M., .** (1996): Road traffic noise and psychiatric disorder:prospective findings from the Caerphilly Study. *BMJ* 313: 266-267.
Ref ID: 458
313. **Stansfeld,SA, Sharp,DS, Gallacher,J, Babisch,W** (1993): Road traffic noise, noise sensitivity and psychological disorder. *Psychol Med* 23: 977-985.
Ref ID: 433
314. **Stansfeld,SA and Shine,P.** Noise sensitivity and psychological responses to noise in the laboratory. Vallet, M. (ed). 2, 481-484. 1993. Cedex France: INRETS. 1993.
Ref Type: Conference Proceeding
Ref ID: 371
315. **Stansfeld,SA, Shine,P** (1993b): Noise sensitivity and psychophysiological responses to noise in the laboratory. In Vallet,M, editor. *Noise and Man 93: Proceedings of the 6th International congress on noise as a public health problem.* Arcueil Cedex, France: INRETS, p Vol 2: 481-484.
Ref ID: 432

316. **Staples,SL** (1998): Comment on 'Effects of aircraft overflights on wilderness recreationists' [J. Acoust. Soc. Am. 100, 2909-2918 (1996)]. *J.Acoust.Soc.Am.* 1998; 104: 1726-1728.
Ref ID: 220
Abstract: A psychologist outside the acoustics community considers the findings of Fidell et al. concerning the effects of aircraft overflights on wilderness recreationists [J. Acoust. Soc. Am. 100, 2009-2918 (1996)] in terms of other findings regarding visitor response to aircraft noise in wilderness areas and in light of current decision making about what actions are necessary to protect natural quiet in national parks. The limitations of a one-dimensional dose-response method that relies on annoyance as a global measure of the effect of park noise on visitors are discussed
317. **Stevenson,DC, McKellar,NR** (1989): The effect of traffic noise on sleep of young adults in their homes. *J.Acoust.Soc.Am.* 85: 768-771.
Ref ID: 363
Abstract: The disturbance of sleep by traffic noise is a major problem area in noise pollution. An experimental technique for obtaining results in peoples homes has been developed using a simplified one-channel EEG. The responses of 6 people were measured. A significant correlation was found between sleep disturbance (measured as sleep stage shifts) and traffic noise when noise is expressed in EPNdB. In home experiments subjects appeared to be approximately 10 dB less sensitive to noises than laboratory subjects for similar noise exposure. (Compared to results from Thiessen). There also appeared to be some adaptation to the noise exposure (for awakenings but not for shifts!); however, only one subject was tested for 20 days.
318. **Stolbun,BM, Karagodina,IL, Soldatkina,SA, Orlova,LG, Bobyleva,OV** (1989): [Effect of transportation noise on the status of the cardiovascular system of the population] Vliianie transportnykh shumov na sostoianie serdechno-sosudistoi sistemy naseleniia. *Gig.Sanit.* 12-16.
Ref ID: 67
Abstract: The results of a multipronged study of noise effect on the state of the cardiovascular system of the urban population are presented. The study of regular noise effect on various population groups has been conducted under natural and laboratory conditions. A complex of appropriate investigation techniques has been used. The population of noise-exposed regions has higher rates and more distinct forms of disorders in myocardium, vessel elasticity, hemodynamics, extracardial regulation and higher risk of cardiovascular disease than those living under more quiet conditions
319. **Sutter,A.** Noise and its effects. 1991. Paper presented at the Administrative Conference of the United States, Washington, DC.
Ref Type: Report
Ref ID: 339
Abstract: Review der Literatur nach den üblichen Gesichtspunkten. Umfassend. Kapitel 5: Effects of noise: hearing -communication -sleep -performance and behavior -extra auditory health effects.
320. **Suzuki,S, Kawada,T, Ogawa,M, and et.al.** Sleep depending effect of steady pink noise. *J Sound Vibr* 151[3], 407-413. 1991.
Ref Type: Journal (Full)
Ref ID: 544
321. **Taylor,M** (1995a): Transportation noise annoyance studies of the McMaster Research Group. *Z.LARMBEKAMPF.* 1995; 42: 32-35.
Ref ID: 225
Abstract: Studies by our McMaster Research Group have examined both aggregate level dose-response relationships between transportation noise and annoyance and individual level analysis of the determinants of annoyance. At the aggregate level, a major focus of our work has been the analysis of source differences in dose-response relationships. Studies in the vicinity of Toronto International Airport showed a greater percentage highly annoyed by aircraft noise than by road traffic noise at the same noise level (L(dn)). Subsequent research

- demonstrated that source differences could be explained by a probabilistic model of annoyance. At the individual level, a principal contribution of our work was the development and testing of a path model of aircraft noise annoyance to estimate the direct and indirect effects of acoustical and non-acoustical factors
322. **Taylor,M** (1995b): Zur Laestigkeit von Verkehrslaerm Untersuchungen der McMaster Forschergruppe Transportation noise annoyance studies of the McMaster group. *Zeitschrift fuer Laermbehaempfung* 42: 32-35.
Ref ID: 324
- Abstract: German ABG: Es wird ueber Studien der McMaster Forschergruppe informiert, die zum einen die Beziehung zwischen Verkehrslaermbelastung und Laestigkeit auf Kollektivebene, zum anderen die Determinanten des individuellen Laestigkeitsempfinden untersuchten. Auf der Ebene von Kollektiven liegt ein besonderer Schwerpunkt in Studien zur Abhaengigkeit der Laermbelastungs-Laestigkeitsrelation von der Art der Laermquelle. Untersuchungen in der Naehة des internationalen Flughafens von Toronto zeigten, dass sich mehr Personen durch Fluglaerm erheblich belaestigt fuehlten als durch Strassenverkehrslaerm gleichen Schallpegels. Nachfolgende Untersuchungen ergaben, dass diese Unterschiede im Rahmen eines probabilistischen Modells der Laestigkeit erklart werden koennen. Einen wesentlichen Bestandteil der Untersuchungen ueber Determinanten der individuellen Laestigkeit stellt die Entwicklung und Testung eines Pfadmodells der Laestigkeit von Fluglaerm dar, welches die Schaetzung von direkten und indirekten Wirkungen akustischer und nicht-akustischer Faktoren ermoeeglicht. (Zeitschrift/Angelika Zimmer - ZPID)
level of aircraft noise vs road traffic noise; collective & individual noise annoyance; empirical study
323. **Taylor,SM** (1984): A path model aircraft noise annoyance. *J.of Sound and Vibration* 96: 243-260.
Ref ID: 410
324. **Thiessen,GJ**. Effect of traffic noise on the cyclical nature of sleep. *J.Acoust.Soc.Am.* 84[5], 1741-1743. 1988.
Ref Type: Journal (Full)
Ref ID: 542
325. **Thomas,GB and Williams,CE**. Noise susceptibility: a comparison of two naval aviator. Naval Aerospace Medical Research Lab. (ed). AD-A172222. 1986. Pensacola, FL, USA, NASA.
Ref Type: Report
Ref ID: 411
326. **Thompson,SJ** (1993): Review: Extraaural health effects of chronic noise exposure in human. In Ising,H, Kruppa,B, editors. *Noise and disease*. Stuttgart: Gustav Fischer, pp 106-117.
Ref ID: 574
327. **Timmerman,NSp**. A citizen acoustician's observations of aircraft noise. Proceedings of the International Conference on Noise Control Engineering, Cambridge, MA. 2, 9251-930. 1986. Cambridge,MA.
Ref Type: Conference Proceeding
Ref ID: 412
328. **Tomei,F, Papaleo,B, Baccolo,TP, Tomao,E, Alfi,P, Fantini,S** (1996): [Chronic noise exposure and the cardiovascular system in aircraft pilots] Esposizione cronica a rumore e apparato cardiovascolare in piloti di aeromobili. *Med.Lav.* 87: 394-410.
Ref ID: 2
- Abstract: The aim of this study was to assess whether pilots are exposed to any risk of effects on the cardiovascular apparatus, whether chronic exposure to noise can be a risk factor for this occupation, the importance of intensity, length and type of exposure to noise, and if any relationship exists between audiometric deficits and cardiovascular effects. The study comprised 416 pilots subdivided into two groups according to the different levels of chronic

exposure to noise, and a group of 150 control subjects not exposed to noise. The results showed: a) a higher prevalence of hypertension, nearly always diastolic, and of ECG abnormalities in the group of pilots of turboprop aircraft compared to jet plane pilots and to controls ($p < 0.005$ and $p < 0.01$ respectively); b) a higher prevalence of orthostatic hypotension in the two groups of pilots than in the controls ($p < 0.05$); c) a higher prevalence of hypertension with audiometric deficit compared to hypertension without audiometric deficit both in the more heavily and in the less heavily exposed to noise ($p < 0.05$), and a higher prevalence of hypertension with audiometric deficit in subjects exposed to higher levels of noise compared to hypertension with deficit but in subjects with lower levels of exposure ($p < 0.05$); d) a higher prevalence of abnormalities of basal, maximum effort and recovery ECG in pilots exposed to higher noise intensity ($p < 0.05$); e) improved hypertensive response to ergometric test in pilots with basal hypertension; f) subjects with a maximal load up to 120 W belonged prevalently to the group exposed to more intense noise ($p < 0.001$), while those with maximal load up to 210 W ($p < 0.001$) belonged to the group exposed to less intense noise. Considering that pilots are comparable for traditional cardiovascular risk factors, including age, both within the group and with the controls, the results confirm 1) that pilots could be exposed to the risk of effects on the cardiovascular apparatus, 2) that noise could be one of the risk factors and that cardiovascular effects could be related to intensity, type and length of exposure, age being the same, 3) that vascular damage is often accompanied by hearing loss even if the response of the auditory apparatus is different from the response of the cardiovascular apparatus, 4) that the postural diminution of arterial blood pressure might be a sign of a cardiovascular effect of noise. Lastly, a higher hypertensive response in hypertensive pilots suggests that basal hypertension is not reversible. Also a longer exposure to noise seems to influence the cardiovascular apparatus, causing a decrease in the response to work loads due to a lower sympathetic adaptability. The altered response of sympathetic activity to the postural modifications in the more exposed subjects and the response to lower work loads in pilots exposed to more intense noise, suggests a hypothesis of catecholamine depletion and alteration of baroreceptor sensitivity as a consequence of chronic sympathetic activation due to chronic exposure to noise

329. **Tonnesen,E, Christensen,NJ, Brinklov,MM** (1987): Natural killer cell activity during cortisol and adrenaline infusion in healthy volunteers. *Eur.J Clin Invest* 17: 497-503.
Ref ID: 524

Abstract: The effects of cortisol and adrenaline on natural killer (NK) cell activity and the distribution of circulating lymphocyte subpopulations were studied in twenty volunteers, using a continuous intravenous infusion pattern to simulate some of the hormonal changes induced by major surgery. The participants were allocated to receive either cortisol for 5 h, adrenaline for 1 h, cortisol for 5 h with simultaneous adrenaline during the last hour, or placebo for 5 h. Cortisol induced leucocytosis, neutrophilia, and lymphopenia with marked reduction in the number of T-lymphocyte subsets (OKT3+, OKT4+, and OKT8+ cells). No changes were induced in the activity or number of NK (Leu 11+) cells. Adrenaline produced an instantaneous increase in NK-cell activity accompanied by a selective increase in circulating NK cells. Significant leucocytosis, lymphocytosis and neutrophilia occurred. All measurements returned to preinfusion levels within 15 min after completing infusion. The effects of simultaneous infusion of cortisol and adrenaline were equal to the additive response to the hormones administered separately, except for the leucocytosis, which clearly exceeded this. In the placebo group all measurements remained unchanged. The results confirm the role of adrenaline as a potent stimulator/inducer of NK-cell activity. Adrenaline may be responsible for the increase in NK-cell activity during anaesthesia and major surgery

330. **Tucker,DC, Hunt,RA** (1993): Effects of long-term air jet noise and dietary sodium chloride in borderline hypertensive rats. *Hypertension* 22: 527-534.
Ref ID: 4

Abstract: The hypothesis that simultaneous exposure to a high (8%) sodium chloride diet and behavioral stress (air jet noise) would act synergistically to increase blood pressure was investigated in male borderline hypertensive rats. Rats were fed either a 1% or an 8% sodium chloride diet beginning at 6 weeks of age. Rats in the Air Noise condition were restrained and exposed to random blasts of air jet noise for 2 h/d, 5 d/wk, from 7 to 17 weeks of age. Controls either were placed in identical restrainers and test chambers but not exposed to air jet noise (Restrained Control) or were left undisturbed (Maturation Control). Biweekly indirect blood pressure measurements showed that by 17 weeks of age, the high-sodium chloride diet

- and air jet noise exposure produced additive increases in blood pressure. Direct blood pressure measurements at 18 weeks of age confirmed the higher systolic pressures in borderline hypertensive rats exposed to both an 8% sodium chloride diet and air jet noise. After ganglionic blockade, the blood pressure of rats in the Air Noise group remained higher than that of Restrained and Maturation Controls, suggesting that the increased blood pressure of air jet noise-exposed rats was not maintained by increased autonomic activity. Blood pressure after maximal vasodilation by hydralazine was increased in rats exposed to both an 8% sodium chloride diet and air jet noise compared with other groups. Baroreceptor reflex sensitivity (tested by graded doses of angiotensin II) did not differ among groups.
331. **Tulen,JHM, Kumar,A, Jurriens,AA** (1986): Psychophysiological acoustics of indoor sound due to traffic noise during sleep. *J.Sound Vib.* 110: 129-141.
Ref ID: 372
332. **Upadhyay,JK, Jain,VK** (1999): Aircraft-induced noise levels in some residential areas of Delhi. *ENVIRON.MONIT.ASSESS.* 1999; 56: 195-207.
Ref ID: 217
Abstract: The measurements of aircraft-induced noise levels in some residential areas in the capital city of India were carried out in the month of April and May, 1996. Four areas were chosen which were located underneath the flight path. It has been found that average increase in noise levels over and above the background levels is more than 20 dBA except in case of the most distant site where it is similar 11 dBA. A good correlation has been found between average peak noise levels (dBA) and the population response in terms of annoyance
333. **Vallet,M** (1987): The effects of non acoustic factors on annoyance due to traffic noise. *Dev.Toxicol.Environ.Sci.* 15: 371-382.
Ref ID: 72
334. **Vallet,M, Gagneux,JM, Clairet,JM, Laurens,JF, and Letisserand,D.** Heart rate reactivity to aircraft noise after long term exposure: Proceedings of the 5th International Congress on Noise as a Public Health Problem. Berglund, B. and Lindvall, Th. (eds). 5. 1988. Stockholm, Sweden, Swedish Council of Building Research.
Ref Type: Conference Proceeding
Ref ID: 571
335. **Vallet,M, Oliver,D, and Laurens,JF.** Effects of road traffic noise on pulse rate during sleep. Proceedings of the 5th International Congress on Noise as a Public Health Problem. Berglund, B. and Lindvall, T. (eds). 5, 354-363. 1990. Stockholm, Sweden, Swedish Council for Building Research.
Ref Type: Conference Proceeding
Ref ID: 559
336. **Vallet,M, Pachiaudi,G, Depitre,A, Tanguy,Y, and Francois,J.** Community reactions to aircraft and residual noise: Proceedings of the 5th International Congress on Noise as a Public Health Problem. Berglund, B., Berglund, U., Karlson, J., and Lindvall, T. (eds). 3, 289-294. 1988. Stockholm, Sweden, Swedish Council for Building Research.
Ref Type: Conference Proceeding
Ref ID: 567
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Abstract: A number of countries have introduced regulations for the protection of people living around airports against the high level of aircraft noise. Certain noise indices have been determined for 24-hour periods, others for extended daytime periods, while a few are weighted for the noise occurring during the night. The noise environment problem limits the

- development of airports and any reduction of the noise at source is balanced by the increase in air traffic so that the overall noise level around airports remains high. The only possibility for the expansion of traffic is during the night and the airport authorities are interested in this solution for airports that remain open at night and in the case of proposals for some new airports in Western Europe. Research yields some useful results with regard to our understanding of the effects of noise and the duration and quality of sleep of people living around airports. In this paper we consider how these results can be used in proposing some noise criteria corresponding to the preservation of a certain quality of sleep JOURNAL-ARTICLE 1993212313 199307
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Ref ID: 58
Abstract: OBJECTIVE: To calculate the cancer incidence in the region surrounding Schiphol. DESIGN: Descriptive epidemiological study based on cancer registry data. SETTING: Comprehensive Cancer Centre Amsterdam. The Netherlands. METHODS: Using noise levels expressed as Kosten-cenheden (Ke) of the air traffic around Schiphol (Amsterdam International Airport) as well as 4-digit postal code areas, two study areas were defined, a central area and an adjacent zone. All cancer cases diagnosed in 1988-1993 in the study areas were selected from the population-based Amsterdam Cancer Registry. Observed numbers of cancer cases were compared with expected numbers on the basis of national and regional cancer incidence rates. RESULTS: Cancer incidence (4535 cases) in 1988-1993 in the Schiphol region was slightly higher than national incidence rates (observed/expected (O/E) ratio: 1.93; 95% confidence interval; 1.00-1.06) and almost equal to regional rates. This was largely due to relatively high rates for breast (O/E ratio: 1.08) and prostate (O/E ratio: 1.11) cancer in the Schiphol region as well as in the total area covered by the Amsterdam Cancer Registry. In addition, leukaemia, lymphoma/multiple myeloma and bladder cancer were more frequent, the last-named especially in males. The incidence of cancer of the respiratory tract was not the same in the central area and the adjacent zone. As compared with national rates, it was increased in the central area (O/E ratio: 1.19), while it was decreased in the adjacent zone (O/E ratio: 0.86). The incidence of cancer of all sites (O/E ratio: 1.10) was also increased in the central area, largely due to smoking related cancers. CONCLUSION: During 1988-1993, cancer incidence in the area surrounding Schiphol was a little higher than the national incidence rates and almost equal to the regional incidence. We could not demonstrate an association between air traffic and increased cancer risk. It is most likely that the differences for certain types of cancer as well as those between the two study areas were due to differences in lifestyle, such as smoking habits
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Abstract: English ABE: Used a full-factorial laboratory design to study the impact of different types of aircraft noise and number of exposures on assessment of overall annoyance and loudness. 36 college students (mean age 26.7 years) were randomly assigned to the noise of one of three aircraft types and exposed to 3, 9, and 27 events in three completely permuted sessions at one-week intervals. They assessed annoyance and overall loudness, and were asked to imagine residential areas with such noise and rate expected domestic interferences and the quality and loudness of the area. Results showed that subjective loudness and annoyance did not increase systematically with either noise or number, but both variables had significant interactions. However, expected interference, loudness, and bad quality in the imagined residential area generally increased with both number and noise.

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Abstract: The authors discuss the problem of improvement the noise factor prevention in aviation medicine. The analysis of the real acoustic load on aviation engineer specialists, performing maintenance of the modern military aircraft have been given. The authors show the importance of the approach to the aviation noise as an ecological significant factor, that means taking into account the acoustic load during work time as well as during rest- sleep periods. The authors suggested the advanced complex of the preventive measures for the purpose of optimization of the noise exposure on the aviation specialists JOURNAL-ARTICLE 1996237593 199610

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Abstract: Average diurnal doses of noise, received by aviation engineers servicing up-to-date aircrafts and living near air fields, were analyzed. The doses appeared to outnumber the normal values, especially during the work and the sleep. The examinees living in 1-2 km from air fields were proved to have significantly higher auditory thresholds for 1,000-8,000 Hz, in comparison with the examinees residing 5-6 km apart. The excessive noise associated with no occupational matters worsens the hearing restoration after the work, promotes accumulation of the hearing fatigue. Those facts were proved by experiments with audiometry and impedometry. The studies stressed the importance of aviation noise as ecologic factor JOURNAL-ARTICLE 1995346197 199511

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348. **Weinstock,M, Matlina,E, Maor,GI, Rosen,H, McEwen,BS** (1992): Prenatal stress selectively alters the reactivity of the hypothalamic-pituitary adrenal system in the female rat. *Brain Res* 595: 195-200.

Ref ID: 528

Abstract: A study was made of the effects of prenatal stress on the reactivity of the hypothalamic-pituitary adrenal (HPA) axis in male and female offspring. Rat dams were subjected to noise and light stress on an unpredictable basis throughout pregnancy. At 28 days of age mRNA for POMC, proenkephalin and prodynorphin were measured in the hypothalamus of the offspring. A marked reduction was found in POMC mRNA in PS females (PSF) but not in males (PSM), but the other mRNA's did not differ from controls (C). At 60

days of age, PSF has 3 times higher resting levels of serum corticosterone (COR) and significantly lower dexamethasone (DEX)3H hippocampal binding sites than CF. Overnight adrenalectomy abolished the difference in DEX binding. After 10 min exposure to open field PS males and females voided more fecal pellets and made fewer center entries than C offspring, testifying to increased emotionality. Open field stress caused a 3-5-fold rise in circulating COR in all groups within 15 min, which returned to baseline by 90 min in all rats except PSF. These data show that prenatal stress can cause permanent alterations in the behavior of both sexes in stressful situations but appears to cause a selective effect on the HPA axis in the female rat

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- Abstract: This study examined the effects of a 30-min laboratory stressor on aspects of immune function in 24 men and whether behavioral control over the stressor moderates stress effects. The stressor consisted of mild (2.5 mA) electric shock and loud (100 dB) white noise administered in an unpredictable, intermittent fashion. During stress sessions, only half of the subjects were able to control the stressor. Subjects with control were yoked to subjects who could not control the stressor so that both groups were exposed to identical intensity and duration of noise and shock. Immunologic function was assessed across stress and nonstress conditions by measuring changes in lymphocyte proliferation to concanavalin A (Con A) and phytohemagglutinin (PHA) and by measuring changes in percentages of lymphocytes and their subpopulations, granulocytes, and monocytes. Results revealed that exposure to the uncontrollable stressor altered mood but did not affect immune function. In contrast, exposure to controllable stress did not alter mood but did result in lowered lymphocyte proliferation to Con A. Poststress percentages of monocytes were also lower in subjects exposed to the controllable stressor. Results suggest that acute stress can alter aspects of immune function in humans and underscore the importance of stressor controllability in moderating stress effects on human immunity
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- Abstract: Twelve people living in areas of high traffic noise were studied to assess its effect on their sleep. During three weeks their sleep was monitored physiologically in the natural setting of their own bedrooms. Their performance and subjective report of sleep was recorded each day. For the middle week the bedroom windows were double glazed to reduce the prevailing level of traffic noise at the bedside (Leq 46.6dBA over the whole night) by an average of 5.8dBA. Most physiological measures were unaffected by the noise reduction, but stage 4 sleep and low frequency, high amplitude delta waves in the EEG, both thought to be signs of deep sleep, were increased. Also unprepared simple reaction time, a test sensitive for drowsiness, was improved the next day, whereas a more stimulating short memory test was not. Subjects also reported sleeping better. These improvements with double glazing were all modest in degree, but as they occurred in three independent and predicted measures of sleep quality the view is supported that the prevailing level of traffic noise does indeed impair sleep.
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Abstract: significant changes in birth weight by noise exposure >85dBA during pregnancy

354. **Wu,TN, Lai,JS, Shen,CY, Yu,TS, Chang,PY** (1995): Aircraft noise, hearing ability, and annoyance. *Arch.Environ.Health* 50: 452-456.

Ref ID: 60

Abstract: The relationship between aircraft noise, loss of hearing, and annoyance was explored in a study in two schools located near an international airport in Taiwan. Sixth-grade students (N = 242) were recruited from two schools and were classified into high- and low-noise-exposure groups, based on environmental noise measurements. Personal-equivalent 24-h noise exposure was measured to determine noise exposure at the individual level, and it was compared with hearing threshold level and with aircraft noise measured at the environmental level. Individual hearing threshold levels did not differ between environmental high- and low-noise-exposure groups, as evidenced by the lack of difference between the two groups for noise exposure measured at the individual level. However, the proportion of students who were annoyed by aircraft noise was higher in the environmental high- noise-exposure group, although personal 24-h noise exposure was not a factor for annoyance. The results indicated that environmental noise measurement was not an appropriate criterion for assessment of auditory damage (or noise-induced hearing loss) in Taiwan. As well, aircraft-noise exposure in Taiwan did not appear to affect the hearing threshold but nonetheless annoyed schoolchildren near the airport

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Abstract: This study examined the association between exposure to occupational hazards and pregnancy outcomes using data from a case-control study conducted in 29 hospitals in Shanghai, China. The sample included 1,875 perinatal deaths and newborns with birth defects and the same number of controls. Information on mother's exposure to occupational radiation, chemicals, noise, and pesticides was investigated. Logistic regression analysis controlling for potential confounders showed that exposure to radiation before/during pregnancy was associated with antepartum fetal death, birth defects, small-for-gestational-age (SGA), and threatened abortion. Exposure to chemicals before/during pregnancy was associated with antepartum fetal death, early neonatal death, birth defects, preterm birth, and threatened abortion. Women exposed to pesticides during pregnancy had an increased risk of SGA and threatened abortion. Exposure to occupational noise during pregnancy increased the risk of antepartum fetal death. Furthermore, higher than expected numbers of congenital anomalies in the central nervous system (CNS) were identified among women exposed to chemicals before pregnancy and to pesticides during the first trimester of pregnancy. No significant association was found between occupational exposure and intrapartum fetal death. Although recall bias may be possible in our study, the findings encourage further research

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