


# Acoustic Requirements for Premises for Personal and Group Psychotherapy

## Literature Review

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**Abstract**—The psychological impact of the war in Ukraine has created an urgent and substantial need for effective mental health interventions, particularly psychotherapy. As offline therapy often requires deep engagement, the quality of the physical environment becomes paramount. This article addresses the critical issue of acoustic comfort in psychotherapy spaces, an essential factor for ensuring patient confidentiality, effective communication, and a conducive therapeutic atmosphere, yet one for which specific standards are currently lacking in Ukraine. Drawing on a review of the literature on post-war mental health needs and the influence of environmental acoustics on well-being and communication, combined with professional experience in engineering acoustics, this article identifies key acoustic parameters necessary for effective therapeutic settings. These include adequate sound insulation to guarantee privacy, controlled reverberation time for speech intelligibility, minimization of intrusive background noise from building systems, and consideration of electroacoustic methods to support individuals with hearing impairments. The analysis highlights that, while there are broader concepts of acoustic design, meeting the specific needs of psychotherapy requires adherence to fundamental principles of acoustic engineering. The article argues that the absence of acoustic standards customised for therapy spaces in Ukraine represents a significant challenge to providing high-quality mental healthcare. It concludes that establishing clear and measurable acoustic criteria is a vital infrastructure to support psychological recovery and lays the groundwork for developing such essential standards.

**Keywords** – *acoustic comfort; psychotherapy; therapy spaces; sound insulation; reverberation time; noise control; speech intelligibility; acoustic standards; therapeutic environment.*

### I. INTRODUCTION

Psychotherapy is currently developing quite actively in Ukraine. Taking into account that after the end of the active phase of hostilities in the Russian-Ukrainian war, which started in 2022, a large number of episodes of various mental and psychological problems should be expected [1, 2]. A significant amount of psychotherapeutic work will be required to work with psychologically traumatized combatants and civilians and to help them adapt to the new post-war realities [1, 2, 8]. In many cases, it is recommended to work offline in offices with the fullest involvement of participants and, probably, with physical contact with other participants [3]. However, there are currently no relevant recommendations or standards for arranging offices for such work in Ukraine. At the same time, acoustically isolated private counseling rooms and group therapy spaces significantly enhance patient outcomes by addressing the detrimental effects of noise and promoting a conducive therapeutic environment [4, 5]. Research indicates that high noise levels in healthcare settings can lead to increased stress and discomfort among patients, negatively impacting their recovery and overall well-being [4, 19].

The design of therapy spaces plays a crucial role in facilitating effective communication and ensuring patient privacy, which are essential for successful therapeutic interventions [5].

### II. AIMS AND OBJECTIVES OF THE RESEARCH

During my professional career as a specialist practitioner in engineering and construction acoustics, I have repeatedly encountered complaints about insufficient confidentiality in the work of psychotherapists due to defects in room soundproofing and/or poor speech intelligibility resulting from acoustic decoration issues. The result of my job is the determination of recommended objective and subjective criteria for acoustic comfort, tailored explicitly for psychotherapy spaces, such as:

- Airborne Sound Insulation Index: Defining required values for partitions and doors to ensure both objective confidentiality and the subjective feeling of safety and privacy.
- Reverberation Time: Establishing a recommended range of reverberation time (RT60) in rooms to ensure necessary speech intelligibility, including the clarity of subtle emotional cues.



- **Background Noise Control:** Ensuring silent operation of ventilation, heating, cooling (HVAC), and other engineering systems to minimize distraction and potential triggering.
- **Electroacoustic Support:** Considering methods for improving acoustic intelligibility for people with hearing impairments, ensuring inclusivity.
- **Subjective Comfort:** Ultimately aiming to ensure a subjective feeling of acoustic safety and comfort for all users.

### III. LITERATURE REVIEW

#### A. Post-War Mental Health Needs in Ukraine

The conclusion of the active phase of hostilities in the Russian-Ukrainian war is likely to be accompanied by an increased prevalence of mental and psychological difficulties among affected populations. The war has exposed these groups to traumatic events, leading to a high prevalence of psychiatric conditions such as depression, anxiety, PTSD, and other trauma-related disorders. The overall mental-health burden appears substantial, indicating a pressing, though still evolving, need for adequate care interventions.

**Prevalence:** A study on Ukrainian adolescents found that 32% screened positive for moderate or severe depression, 17.9% for anxiety, and 35% for clinically relevant psychological trauma [1]. Among children seeking mental health treatment, nearly 70% met the criteria for PTSD, with even higher rates in preschool children [6]. Parents reported increased internalizing, externalizing, and attention problems in their children, with 35% noting an increase in worry since the war began [7].

**Refugee Impact:** Ukrainian refugees, numbering over 6.5 million, are at increased risk of mental health problems, including PTSD and general psychological distress [8]. The vulnerability of refugees highlights the need for targeted interventions in appropriate environments [8].

**Behavioral Changes:** Ukrainian youth have reported increased fatigue, irritability, mood swings, and somatic disorders such as disturbed sleep and poor appetite [2]. These changes reflect a broader pattern requiring psychological attention [2].

While resilience and coping mechanisms exist, the presence of supportive networks and access to adequate mental health resources are crucial for mitigating adverse effects and promoting recovery. Effective psychotherapy is a key strategy.

#### B. Impact of Acoustic Design on Patient Comfort and Therapeutic Outcomes

The quality of acoustic finishing in psychotherapy rooms appears to have a measurable influence on therapeutic effectiveness. Key issues include:

**Noise Reduction:** Implementing sound-absorbing materials and ensuring adequate sound insulation lowers noise levels, fostering a calming atmosphere essential for therapy [4]. High noise levels are generally linked to increased stress and discomfort [4, 19].

**Patient Privacy and Safety:** Acoustic isolation enhances confidentiality, allowing patients to express themselves freely [4]. A subjective sense of safety appears to be essential, as even a perceived lack of privacy may gradually erode the therapeutic alliance.

**Enhanced Treatment Response:** A well-designed acoustic environment can improve patient-reported outcomes [9]. Conversely, overly enhanced or unfamiliar environments may sometimes hinder comfort [9].

**Restorative Soundscapes:** While often applied outdoors, the concept of using pleasant sounds (like natural sounds) to provide restorative benefits can be relevant indoors [10], although careful design is needed. However, the primary goal in therapy rooms is often to minimize distractions.

**Cognitive Performance:** Irrelevant speech and excessive noise negatively impact cognitive function [13], concentration [25], and performance on tasks requiring working memory, such as proofreading or mental arithmetic [27]. This aspect is particularly relevant, given that therapeutic interaction typically involves complex cognitive and emotional processing on the part of both the client and the therapist. Poor acoustics can increase cognitive load and stress [13]. Studies in schools have shown impaired performance in children exposed to high noise levels [25], highlighting their vulnerability, which is especially relevant for child therapy. Even moderate levels of intelligible speech (e.g., 48 dBA) can impair performance compared to continuous noise or masked speech [27]. Reduction in performance [27] and increase in error rates [25] are measurable consequences of poor acoustics. While masking noise can be beneficial [27], it must be carefully designed to avoid becoming an additional annoyance source [27]. Low-frequency noise also requires special attention [25].

#### C. Factors Influencing Acoustic Comfort Perception

The perception of acoustic comfort is influenced by physical and psychological factors [24]:

**Physical Factors:** Sound pressure levels (intensity) [11], frequency composition, temporal characteristics (fluctuations, impulsivity), and acoustic design elements (materials, spatial configuration affecting absorption and transmission) [12]. In open-plan offices, irrelevant speech is a primary source of disturbing noise [13]. Even noise from building systems (HVAC) can significantly impact experience [20].

**Psychological Factors:** Emotional responses (unpleasant sounds causing stress/fatigue) [13], perception



of sound type (natural sounds potentially enhancing comfort) [11], individual differences in sound perception and sensitivity [14], expectations [9], and non-acoustical factors like predictability, controllability, and attitude towards the noise source significantly modify annoyance [19, 23]. Annoyance itself is a multi-faceted stress reaction involving disturbance, negative emotions, and cognitive appraisal [19, 23]. It is recognized as a significant public health concern related to noise [23].

Understanding these factors is crucial for creating environments that promote well-being, particularly in the sensitive context of psychotherapy.

#### IV. ANALYSIS AND DISCUSSION: TOWARDS SPECIFIC STANDARDS

##### A. Unique Acoustic Demands of Psychotherapy Spaces

Psychotherapy environments present distinct acoustic challenges when contrasted with ordinary office or general healthcare spaces. It is a space where vulnerability is encouraged, deep emotional processing occurs, and the therapeutic alliance relies heavily on trust and safety. Sound, or the lack thereof, plays an active role:

**Heightened Sensitivity:** Clients, particularly those dealing with trauma, anxiety, or hypervigilance [1, 2, 8], may have heightened sensitivity to auditory stimuli. Background noise, sudden sounds, or overheard speech can be more than just distracting; they can be triggering, increasing anxiety, and hindering the therapeutic process.

**Importance of Subtle Cues:** Therapy often involves attending to subtle vocal cues (tone, pauses, sighs) that convey emotional meaning. Excessive reverberation or masking background noise can obscure these vital elements of communication.

**Confidentiality as Foundation:** Absolute confidentiality is non-negotiable. The *perception* of privacy is as important as the experience of privacy [21]. If a client fears being overheard or can clearly hear external sounds, the sense of safety is compromised, impeding disclosure and trust. Standard office sound insulation levels may be insufficient to create this necessary subjective feeling of security [21].

**Concentration Demands:** Both therapist and client require high levels of sustained attention and concentration [25, 27]. Distractions from poor acoustics (intelligible external speech, system noise, high reverberation) directly impede the cognitive and emotional work of therapy [25, 27].

##### B. Evaluating Existing Standards and Identifying Gaps

The assessment of acoustic comfort in psychotherapy spaces necessitates a thorough examination of both local

Ukrainian standards and relevant international guidelines, identifying gaps and opportunities for adaptation.

**Ukrainian Regulations:** Existing Ukrainian regulations, including ДБН В.1.1-31:2013 (general noise protection) [17] and ДБН В.2.2-10:2019 (healthcare facilities) [18], provide fundamental guidance on sound insulation and noise levels. However, these norms target generic offices, medical wards, or educational premises and lack specificity for the unique psychoacoustic needs of therapy [17, 18]. Similarly, the Санітарні норми (Наказ МОЗ №463, 2019) [28] establish maximum background noise levels but do not adequately address speech privacy or emotional safety, which are crucial for therapy [28]. While providing a baseline, they fail to consider the heightened sensitivity and confidentiality requirements inherent in psychotherapy.

**International Guidelines:** International standards like BB93 (UK schools) [29], LEED v4 (Green Building) [30], BREEAM (UK Green Building) [31], DGNB (German Green Building) [32], [33], and DIN 18041 (German standard for rooms) [34] offer more detailed recommendations on reverberation time, sound insulation, background noise, and subjective comfort evaluation [29–34]. BB93 defines criteria for speech intelligibility and privacy in examination rooms [29], which are analogous but insufficient, as they do not address uninterrupted emotional disclosure or sensitivity to low-level noise [29]. LEED [30], BREEAM [31], and DGNB [32, 33] introduce guidelines for HVAC noise, acoustic zoning, and subjective experience, but again, lack direct consideration of the psychoacoustic demands of therapy (perception of silence, sensitivity to transient noises, enhanced speech privacy). Studies comparing offices also show that standard metrics, such as  $R_w$ , might not perfectly capture the subjective experience in small rooms [21]. Experience from acoustically challenging environments, such as metro stations, demonstrates the significant improvements possible with targeted interventions like absorption and vibration isolation [20].

This comparative analysis demonstrates that while existing standards provide practical frameworks, they fall short in the context of psychotherapy spaces. Ukrainian norms lack specificity, and while international standards are more advanced, they are not tailored to the unique therapeutic context.

##### C. Linking Research Objectives to Therapeutic Needs and Literature

Our objectives directly address the identified gaps, grounded in the literature:

**Sound Insulation:** Objective 1 aims to define insulation indices ( $R_w$ ,  $D_{nT,w}$ ) for walls and doors. This is supported by studies emphasizing the importance of privacy [4] and the detrimental effects of noise [19]. The vulnerability of post-war populations [8] underscores the need



for environments ensuring both actual and perceived safety, potentially requiring higher values (e.g.,  $R_w \geq 55$  dB) than standard confidential rooms [Table I]. Studies in small office rooms confirm that even moderate  $R_w$  values (e.g., 46 dB) can result in clearly intelligible speech transfer, which can be annoying, especially with low background noise [21].

**Reverberation Time:** Objective 2 focuses on RT60 for speech intelligibility. Research on cognitive performance highlights the negative impact of poor acoustics and irrelevant speech [13, 27]. Controlled reverberation appears crucial not only for maintaining adequate speech clarity but also for enabling the perception of subtle emotional nuances. Aiming for ranges of 0.3–0.4 seconds for small rooms and 0.5–0.6 seconds for group rooms seems appropriate [Table I], optimizing intelligibility without creating an overly 'dead' space. High reverberation can also increase perceived noise levels.

**Background Noise:** Objective 3 addresses noise from building systems. Studies confirm the impact of even low-level continuous noise on comfort [11]. For trauma-sensitive environments, minimizing potential triggers is paramount. Achieving very low background noise levels (e.g., NC 25–30) is necessary to create a calm, non-distracting atmosphere [Table I]. Low background noise, however, also makes intruding sounds (like speech from adjacent rooms) more noticeable [21], reinforcing the need for high sound insulation.

**Electroacoustic Methods:** Objective 4 considers inclusivity for hearing impairments. Acknowledging individual differences in perception [14] and potential war-related injuries makes assistive listening systems a necessary consideration, especially in group settings [Table I].

#### D. Proposed Acoustic Requirements

Based on this comparative analysis and professional experience [24], Table I proposes adapted acoustic requirements for psychotherapy spaces, synthesizing Ukrainian regulations, international standards, and specific therapeutic needs.

Note: These values are proposed starting points for standardization and may require further refinement based on room size, specific therapeutic modality, and user feedback.

#### E. Considerations Regarding Design Methods and Materials

Although recent literature increasingly addresses broader notions such as soundscapes [16] and the integration of natural or recycled materials [12, 15], their verified acoustic efficacy appears to depend on rigorous engineering support in addition to design intent. Relying solely on aesthetic or ecological features without considering core acoustic principles (mass, absorption, isolation, vibration damping) is unlikely to meet the stringent

needs of psychotherapy spaces. Effective solutions often involve conventional acoustic materials and constructions, such as appropriate wall assemblies, sound-absorbing ceilings/panels, and vibration isolation for equipment or structures [20]. The integration of user feedback and consideration of the multisensory experience is also crucial [16], as it avoids solutions that are acoustically sound but visually or otherwise uncomfortable [21].

### CONCLUSION

The preceding analysis establishes a critical need for accessible and effective psychotherapy in post-war Ukraine and demonstrates that the acoustic environment is an active component influencing therapeutic outcomes. Acoustic comfort – encompassing privacy, communication clarity, absence of disruptive noise, and a sense of safety – emerges as fundamental for effective therapy, especially in trauma-informed contexts.

TABLE I: PROPOSED ACOUSTIC REQUIREMENTS FOR PSYCHOTHERAPY SPACES

Acoustic Parameter	Adapted Recommended Value	Source or Basis for Adaptation	Justification for Psychotherapy Context
Background Noise Level ( $L_{Aeq}$ )	25–30 dBA	Adapted from Санітарні норми №463 [28], BB93 [29], LEED ID+C [30]	Ensures minimal auditory distraction, promotes emotional focus, avoids triggering
Airborne Sound Insulation ( $R'_{w}/D_{nT,w}$ ) walls	$\geq 55$ dB	Adapted from ДБН Б.1.1-31 [17], BB93 exam rooms [29], DGNB TEC1.2 [33]	Guarantees confidentiality, speech privacy, and perceived safety
Airborne Sound Insulation ( $R'_{w}/D_{nT,w}$ ) doors	$\geq 42$ dB		
Reverberation Time ( $RT_{60}$ ) for small rooms	0.3–0.4 s	Adapted from BB93 [29], DIN 18041 [34]	Prevents echo, enhances clarity of speech, and subtle emotional cues
Reverberation Time ( $RT_{60}$ ) for group rooms	0.5–0.6 s	BB93 [29], LEED [30]	Maintains intelligibility without acoustic harshness in larger spaces
Impact Noise from Adjacent Corridors ( $L'_{n,w}$ )	$\leq 45$ dB	Adapted from BREEAM Pol 05 [31], DBN general building guidance [17]	Reduces startle/distraction from footsteps, doors, or external activities
Mechanical / HVAC Noise	NC 25–30	Derived from LEED ID+C [30], BREEAM Hea 05 [31], DGNB SOC1.3 [32]	Ensures systems operate below the perceptual threshold for therapeutic calm
Assistive Listening Support	An induction loop or wireless system is recommended for group therapy	DGNB SOC1.3 [32], LEED Acoustic Performance [30]	Provides inclusivity for deaf patients



The identified key acoustic criteria (high sound insulation, controlled reverberation, minimal system noise, and provision for hearing impairments) are directly supported by literature. Insufficient insulation breaches confidentiality and perceived safety [4]. High reverberation and background noise impair speech intelligibility, hinder emotional clarity, and increase cognitive load [13]. Addressing hearing impairments ensures equity [14]. Experience from offices [27] and schools [25, 26] reinforces the negative impact of poor acoustics on concentration and performance.

While existing Ukrainian [17, 18, 28] and international standards [29–34] offer baselines, they are insufficient for the specific psychoacoustic demands of therapy.

This analysis provides a strong evidence base for developing contextually relevant standards in Ukraine—the proposed criteria in Table I offer concrete starting points.

Implementation requires collaboration between mental health professionals, acousticians, architects, and policymakers. Challenges include costs and stakeholder education. However, investing in acoustically appropriate spaces is essential infrastructure for psychological recovery, not a luxury. This work lays the groundwork by identifying specific, measurable parameters linked to the therapeutic process. Future work must translate these into enforceable standards for Ukraine, supporting the nation's mental health needs.

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# Акустичні вимоги до приміщень для особистої та групової психотерапії

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**Анотація**—Психологічний вплив війни в Україні створив нагальну та суттєву потребу в ефективних втручаннях у сфері психічного здоров'я, зокрема в психотерапії. Оскільки офлайн-терапія часто є вирішальною для глибокої взаємодії, якість фізичного середовища стає першочерговою. У цій статті розглядається критичне питання акустичного комфорту в психотерапевтичних приміщеннях, що є важливим фактором для забезпечення конфіденційності пацієнтів, ефективної комунікації та сприятливої терапевтичної атмосфери, проте для цього наразі в Україні відсутні конкретні стандарти. Спираючись на огляд літератури щодо потреб психічного здоров'я після війни та впливу акустики навколишнього середовища на самопочуття та комунікацію, у поєднанні з професійним досвідом в інженерній акустиці, у цій статті визначено ключові акустичні параметри, необхідні для ефективних терапевтичних умов. До них належать адекватна звукоізоляція для гарантування конфіденційності, контрольований час реверберації для розбірливості мовлення, мінімізація нав'язливого фонового шуму від систем будівель та розгляд електроакустичних методів для підтримки людей з вадами слуху. Аналіз підкреслює, що хоча існують ширші концепції акустичного проектування, задоволення конкретних потреб психотерапії вимагає дотримання фундаментальних принципів акустичної інженерії. У статті стверджується, що відсутність індивідуальних акустичних стандартів для терапевтичних приміщень в Україні є значним викликом для забезпечення високоякісної психіатричної медичної допомоги. У ньому робиться висновок, що встановлення чітких, вимірюваних акустичних критеріїв є життєво важливою інфраструктурою для підтримки психологічного одужання та закладає основу для розробки таких важливих стандартів.

**Ключові слова** — акустичний комфорт; психотерапія; терапевтичні простори; звукоізоляція; час реверберації; контроль шуму; розбірливість мовлення; акустичні стандарти; терапевтичне середовище.

