

HEARING LOSS AND DEPRESSION IN OLDER ADULTS: SOCIAL ISOLATION AND LONELINESS AS MEDIATING PATHWAYS. A NARRATIVE REVIEW WITH IMPLICATIONS FOR PAKISTAN

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KEYWORDS

Age Related Hearing Loss, Late-Life Depression, Loneliness, Social Isolation, Pakistan

CITE THIS ARTICLE:

Imtiaz, B. (2026). Hearing Loss and Depression in Older Adults: Social Isolation and Loneliness as Mediating Pathways. A Narrative Review with Implications for Pakistan. *Pakistan Journal of Positive Psychology*, 3(2), 209–221.

ABSTRACT

Age-related hearing loss is among the most prevalent chronic conditions of later life, and a large observational literature links it to depressive symptoms in older adults. The mechanism most often proposed is psychosocial: hearing loss degrades conversational participation, which produces social disconnection, which produces depression. This review asks whether that pathway carries the effect and which component of disconnection matters, because the answer determines how the problem should be addressed. It establishes the magnitude of the association, examines social isolation and loneliness as distinct mediating variables, appraises the recent intervention evidence, and assesses what this means for Pakistan. Literature was identified through structured searching of PubMed, PsycINFO, Scopus, Google Scholar and PakMediNet for material published between January 2010 and May 2026, supplemented by institutional reports and Pakistani grey literature, and was synthesised thematically. Meta-analytic evidence places the pooled association at an odds ratio of approximately 1.47, an effect the original authors themselves describe as very small, and effect sizes attenuate sharply in longitudinal designs. Mediation analysis in a large Chinese cohort found that loneliness accounted for approximately 42 percent of the total effect while objective social isolation accounted for only 8 percent, which suggests, on the basis of a single well measured study, that the perceived rather than the structural dimension of social disconnection carries most of the pathway. Randomised evidence now shows that hearing intervention improves social network size, network quality, and loneliness, and that low-cost amplification delivered by community health workers reduces depressive symptoms. Pakistani evidence is sparse and contains implausibly low prevalence estimates, indicating substantial under-ascertainment. The practical implication is that amplification alone is unlikely to be sufficient and should be paired with communication partner training and structured social re-engagement. For Pakistan the prior requirement is population-level measurement using audiometric rather than self-reported ascertainment.

I. INTRODUCTION

Hearing is not primarily a sensory convenience. It is the medium through which most social relationships are conducted. When hearing degrades, what degrades with it is not simply the perception of sound but the capacity to participate in the ordinary conversational exchanges that constitute social life. This distinction matters because it reframes hearing loss from an otological problem into a psychosocial one, and it is the reason the condition has

attracted sustained attention from psychology and public mental health rather than audiology alone (Rutherford et al., 2018; Shukla et al., 2020). The scale is substantial. The World Health Organization estimates that over 5 percent of the world population, approximately 430 million people, require rehabilitation for disabling hearing loss, defined as loss exceeding 35 decibels in the better hearing ear. By 2050 nearly 2.5 billion people are projected to have some degree of hearing loss and more than 700 million will require rehabilitation (World Health Organization [WHO], 2021, 2026). Global Burden of Disease modelling places the 2050 figure at 2.45 billion, a 56.1 percent increase from 2019 driven by population ageing despite stable age standardised prevalence (GBD 2019 Hearing Loss Collaborators, 2021). Prevalence rises steeply with age: over 25 percent of adults older than 60 are affected by disabling hearing loss, and estimates for age related hearing loss reach 63.1 percent in those over 70 and 80.6 percent in those over 85 (WHO, 2021).

The distributional pattern is equally important. Nearly 80 percent of people with disabling hearing loss live in low and middle income countries, where ear and hearing care infrastructure is weakest and hearing aid access is lowest (WHO, 2021). Unaddressed hearing loss carries an estimated annual global cost approaching one trillion international dollars, encompassing health sector costs, educational support, productivity loss and broader societal costs (WHO, 2021; Chadha et al., 2021). Depression in later life is similarly prevalent and similarly consequential, contributing substantially to disability adjusted life years lost in older populations and elevating suicide risk. The observation that these two conditions co-occur more often than chance would predict has generated a large literature (Cosh et al., 2019; Rutherford et al., 2018). The question this review addresses is not whether they co-occur but why, and specifically whether social disconnection is the mechanism that links them. The proposed pathway has intuitive appeal. An older adult who cannot follow conversation in a group setting experiences repeated communicative failure. Repeated failure generates effort, fatigue and embarrassment. These produce avoidance of the situations in which failure occurs. Avoidance produces withdrawal from social contact. Withdrawal produces isolation, loneliness and, eventually, depression (Rutherford et al., 2018; Maharani et al., 2019; Shukla et al., 2020). Each step is plausible. Whether the sequence holds empirically, and whether the critical variable is the objective reduction in social contact or the subjective experience of loneliness, is an empirical question with substantial practical consequence.

That consequence is straightforward. If objective network shrinkage drives the effect, then restoring auditory access through amplification should be sufficient, because it restores the capacity to participate. If subjective loneliness drives the effect, amplification alone will be inadequate, because a person can be surrounded by people and remain lonely (Cacioppo & Hawkley, 2009), and because the psychological residue of years of communicative failure does not resolve when a device is fitted (Ferguson et al., 2017). The distinction determines whether hearing rehabilitation is an audiological intervention or a combined audiological and psychosocial one. This review therefore has four objectives:

1. To establish what the epidemiological evidence actually shows about the hearing loss and depression association, including its magnitude
2. To examine the mediation evidence with attention to the conceptual and measurement distinction between social isolation and loneliness
3. To appraise the intervention evidence that has emerged since 2023, which for the first time permits causal inference. Fourth, to assess the Pakistani evidence base and identify what is required to make this a tractable public health problem in a country whose older population is projected to expand substantially.
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II. METHOD

Search Strategy

This is a narrative review. Literature was identified through structured searching of PubMed, PsycINFO, Scopus, Google Scholar and PakMediNet, the last included to capture Pakistani journals not indexed internationally. The search covered material published between January 2010 and May 2026, with foundational conceptual and psychometric sources included irrespective of date where they define constructs or instruments still in current use.

Search terms were combined across four concept clusters. The exposure cluster comprised hearing loss, hearing impairment, presbycusis, age related hearing loss and deafness. The outcome cluster comprised depression, depressive symptoms, psychological distress and mental health. The mediator cluster comprised social isolation, loneliness, social network, social participation and social withdrawal. The population and setting cluster comprised older adults, elderly, geriatric, Pakistan and South Asia. Boolean operators and truncation were applied as appropriate to each database, and reference lists of retrieved systematic reviews were hand searched.

Inclusion and Exclusion Criteria

Studies were included where they reported quantitative associations between hearing status and depressive outcomes in adults aged 50 years and older, where they examined social isolation or loneliness as mediating or moderating variables, where they evaluated interventions with mental health or social connection outcomes, or where they provided epidemiological or policy context. Systematic reviews, meta-analyses, randomised controlled trials, cohort studies and cross-sectional studies were all eligible. Institutional reports from the World Health Organization and comparable bodies were included as grey literature. Studies were excluded where the population was predominantly under 50 years, where hearing loss was congenital or prelingual rather than acquired in adulthood, where depression was assessed without a validated instrument, or where methodological reporting was insufficient to permit appraisal. Single case reports and conference abstracts without accompanying full publication were excluded.

Synthesis and Appraisal

Material was organised thematically rather than pooled statistically. Particular attention was paid to three appraisal dimensions that distinguish stronger from weaker evidence in this literature: whether hearing loss was ascertained audiometrically or by self-report, since self-report is subject to bias and may itself be influenced by depressive state; whether the design was cross-sectional or longitudinal, since cross-sectional mediation analysis cannot establish temporal sequence; and whether social isolation and loneliness were measured as distinct constructs or conflated, since the review's central question depends on that separation.

III. RESULTS

Epidemiology of Hearing Loss and Late-Life Depression

Age related hearing loss

Age related hearing loss, or presbycusis, is a progressive, bilateral and typically symmetrical sensorineural condition arising from cumulative ageing of the auditory system, affecting high frequencies first and disproportionately (WHO, 2021; Rutherford et al., 2018). This frequency profile is clinically important because consonant sounds, which carry most of the information distinguishing one word from another, occupy the high frequency range. The characteristic complaint of the person with early presbycusis is therefore not that speech is quiet but that it is unclear, and that clarity collapses specifically in noisy or multi-speaker environments. This is precisely the acoustic condition of most social gatherings (Rutherford et al., 2018). Age related hearing loss ranks among the most common chronic conditions of later life (WHO, 2021; GBD 2019 Hearing Loss Collaborators, 2021). Its onset is gradual, which has two consequences relevant to this review. First, the affected individual frequently does not recognise the loss, attributing communicative difficulty to others mumbling or to environmental noise. Second, behavioural adaptation, including avoidance of difficult listening situations, occurs long before help is sought, meaning social withdrawal may precede diagnosis by years.

Depression in later life

Depression is a leading global cause of disability, affecting approximately 280 million people worldwide (World Health Organization, 2023). In older adults it is frequently under-recognised, partly because presentation differs from that in younger populations, with somatic complaints, irritability and cognitive slowing often more prominent than reported sadness, and partly because low mood is misattributed to normal ageing by clinicians, families and older adults themselves. Where hearing loss and depression coexist, this diagnostic difficulty compounds, since the

withdrawal and reduced responsiveness produced by hearing loss can be mistaken for depressive symptoms and vice versa (Rutherford et al., 2018).

The Association Between Hearing Loss and Depression

Meta-analytic evidence

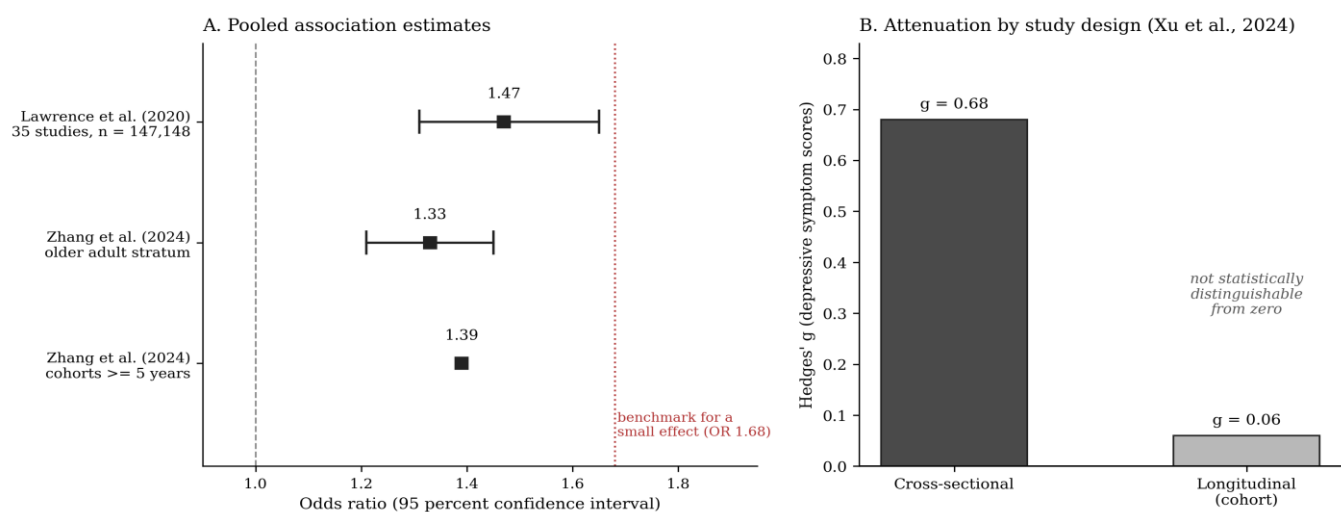
The most widely cited synthesis identified 35 studies comprising 147,148 participants, of which 24 were cross-sectional and 11 were cohort designs (Lawrence et al., 2020). Pooled random effects analysis produced an odds ratio of 1.47 with a 95 percent confidence interval of 1.31 to 1.65 for the association between hearing loss and depression in older adults. Stratification by design produced an odds ratio of 1.54 in cross-sectional studies and 1.39 in cohort studies, with no statistically significant difference between the two estimates. No evidence of publication bias was detected. Certainty in the overall effect estimate was nonetheless classified as low. A separate meta-analysis focused specifically on age related hearing loss reported that affected older adults exhibited higher depressive symptom scores than those with normal hearing, with a pooled Hedges g of 0.52 (Xu et al., 2024). The subgroup pattern here is instructive and rarely emphasised: the effect size in cross-sectional studies was 0.68 while in cohort studies it was 0.06 and not statistically distinguishable from zero. Meta-regression indicated that effect size was significantly associated with the proportion of female participants but not with mean age. A further meta-analysis reported an odds ratio of 1.33 with a confidence interval of 1.21 to 1.45 for older adults specifically, with a higher estimate of 1.39 in cohorts followed for five years or longer (Zhang et al., 2024).

Table I: Principal Meta-Analytic Estimates of the Association between Hearing Loss and Depression in Older Adults

Synthesis	Scope	Pooled Estimate	Notable Qualification
Lawrence et al., 2020	35 studies, 147,148 participants, older adults	OR 1.47 (1.31 to 1.65)	Certainty rated low; authors subsequently characterised the effect as very small
Xu et al., 2024	ARHL versus normal hearing, depressive symptom scores	Hedges g 0.52	Cross-sectional g 0.68 versus cohort g 0.06; moderated by proportion female
Zhang et al., 2024	All ages with age stratification	OR 1.33 (1.21 to 1.45) in older adults	Higher in cohorts with follow-up of five years or more (OR 1.39)

Note. The systematic attenuation of effect size in longitudinal relative to cross-sectional designs. Source: compiled by the author from Lawrence et al. (2020), Xu et al. (2024) and Zhang et al. (2024).

Figure I: Pooled Association Estimates and Attenuation by Study Design



Panel A shows pooled odds ratios with 95 percent confidence intervals against the conventional benchmark for a small effect. Panel B shows the difference in standardised mean difference between cross-sectional and cohort

studies. Source: compiled by the author from Lawrence et al. (2020), Zhang et al. (2024), Xu et al. (2024) and Chen et al. (2010).

The effect size problem

A point of unusual intellectual honesty in this literature deserves emphasis, because it is routinely omitted when the association is cited. The authors of the principal meta-analysis subsequently published a commentary noting that the size of the association is very small (Lawrence et al., 2021). Under conventional interpretive benchmarks for odds ratios, a value of 1.68 constitutes a small effect, 3.47 a medium effect and 6.71 a large effect (Chen et al., 2010). A pooled odds ratio of 1.47 therefore falls below even the small threshold. The authors explicitly recommended that future researchers exercise greater caution in interpreting and communicating effect magnitude in this area. This has two implications. Descriptively, hearing loss is a real but modest correlate of late-life depression rather than a dominant determinant, and studies presenting it as a major driver overstate the evidence. Analytically, the systematic attenuation of effect size from cross-sectional to longitudinal designs, most starkly the fall from a Hedges g of 0.68 to 0.06 (Xu et al., 2024), raises the possibility that a substantial portion of the cross-sectional association reflects reverse causation, common cause confounding or reporting bias rather than a causal effect of hearing loss on mood. Reverse causation is a genuine concern where hearing loss is self-reported, because depressed individuals systematically report worse functioning across domains (Lawrence et al., 2020; Cosh et al., 2019). This constitutes a strong methodological argument for audiometric ascertainment, and studies employing pure tone audiometry within longitudinal designs represent the most reliable available evidence on this question.

Social Isolation and Loneliness as Mediating Pathways

Distinguishing the two constructs

Social isolation and loneliness are related but conceptually and empirically distinct, and treating them as interchangeable is the most common analytical error in this literature (Holt-Lunstad et al., 2015; Shukla et al., 2020). Social isolation is objective and structural, referring to the quantity of social contact, the size and diversity of a social network, and the frequency of interaction. It is measurable by counting relationships and contacts. Loneliness is subjective and evaluative, referring to the perceived discrepancy between desired and actual social connection. It is measurable only by asking (Cacioppo & Hawkley, 2009; National Academies of Sciences, Engineering, and Medicine, 2020). The two dissociate in both directions. An older adult living in an extended household in Lahore may have daily contact with numerous family members, and therefore register as socially connected on any structural measure, while experiencing profound loneliness because hearing loss prevents genuine participation in the conversations occurring around them. Conversely, an older adult living alone with limited contact may not feel lonely if the contact they have is satisfying (Holt-Lunstad et al., 2015; National Academies of Sciences, Engineering, and Medicine, 2020). For a review concerned with hearing loss this distinction is critical, because hearing loss plausibly affects the two differently: it may leave network size largely intact while devastating the perceived quality of connection within it.

Table II: Conceptual and Measurement Distinction between Social Isolation and Loneliness

Dimension	Social Isolation	Loneliness
Nature	Objective and structural	Subjective and evaluative
Definition	Quantity and diversity of social contact and network ties	Perceived discrepancy between desired and actual connection
Common instruments	Lubben Social Network Scale, Cohen Social Network Index	UCLA Loneliness Scale, De Jong Gierveld Loneliness Scale
Relation to hearing loss	May remain relatively intact where household or community contact is culturally sustained	Directly degraded by inability to participate meaningfully in available interaction
Intervention implication	Addressed by increasing contact opportunity	Requires restoration of communicative quality, not contact quantity alone

Conceptual and measurement distinction between social isolation and loneliness, with implications for hearing loss research and intervention design. Source: compiled by the author from Holt-Lunstad et al. (2015), Cacioppo and Hawkley (2009), National Academies of Sciences, Engineering, and Medicine (2020) and Shukla et al. (2020).

The mediation evidence

The most direct test of the mediation hypothesis comes from a cross-sectional analysis of 3,769 adults aged 60 years and above in Shandong province, China (Ye et al., 2022). The methodological quality of this study is notably higher than most in the field: hearing loss was assessed by pure tone audiometry rather than self-report, depressive symptoms by the 15-item Geriatric Depression Scale, loneliness by the UCLA Loneliness Scale and social isolation by the Lubben Social Network Scale (Yesavage & Sheikh, 1986; Russell, 1996; Lubben et al., 2006). Regression and bootstrap analyses tested both direct associations and mediating roles, following the bootstrapped indirect effect approach now standard in the field (Hayes, 2022), which supersedes the earlier causal steps procedure (Baron & Kenny, 1986). Hearing loss was present in 44 percent of the sample, predominantly mild at 30 percent, with moderate loss in 10 percent, severe in 3 percent and profound in 0.6 percent. Increasing severity of hearing loss was associated with increasing social isolation and increasing depressive symptoms. The mediation result is the important finding: approximately 8 percent of the total effect of hearing loss on depressive symptoms was explained by social isolation, while approximately 42 percent was explained by loneliness (Ye et al., 2022). The direct association remained statistically significant at all levels of hearing loss even after both mediators were included in the model.

Figure II: Proposed Mediation Model

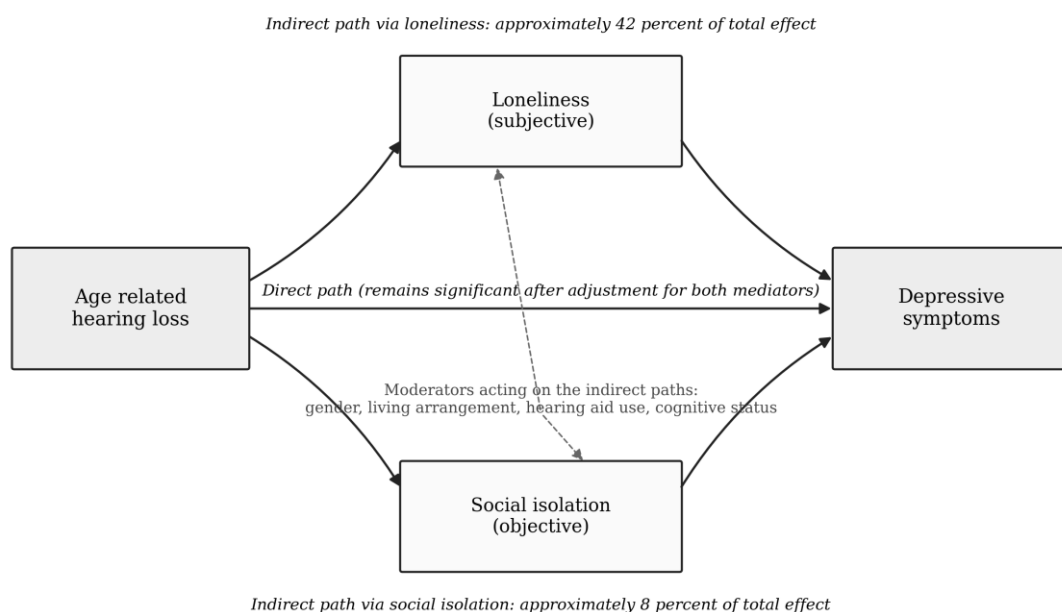


Figure 1 proposed mediation model linking age related hearing loss to late-life depression, showing the direct path alongside two indirect paths and the approximate proportion of total effect mediated by each. Proportions derived from Ye et al. (2022). Three conclusions follow. First, the psychosocial pathway is real and substantial, accounting for roughly half of the total effect when both mediators are combined (Ye et al., 2022). Second, and more consequentially, the pathway appears to run predominantly through the subjective rather than the objective dimension, although this rests on a single study and awaits replication. Loneliness carries approximately five times the mediated effect that social isolation does. Third, the persistence of a significant direct effect after mediator adjustment indicates that psychosocial mechanisms do not exhaust the relationship, and that additional pathways must be operating.

Why loneliness rather than isolation

The dominance of loneliness over structural isolation is explicable through the phenomenology of acquired hearing loss. The older adult with presbycusis typically remains physically present in social settings. They attend family

gatherings, sit in the room, are counted in any network enumeration. What they lose is not presence but participation. They cannot follow rapid multi-speaker conversation, they miss the humour, they respond inappropriately or not at all, and they gradually become an observer of interactions they were formerly part of (Maharani et al., 2019). This produces a specific psychological state that structural measures cannot capture: being among people while feeling apart from them. It is accompanied by identifiable secondary phenomena including listening effort and consequent fatigue, embarrassment at repeated requests for repetition, anticipatory anxiety about social situations, and eventual pre-emptive withdrawal (Rutherford et al., 2018; Dawes et al., 2015; Shukla et al., 2020). It is also frequently accompanied by a subtle but corrosive change in how others communicate with the affected person, including simplification of content, speaking to accompanying family members rather than directly, and eventual exclusion from consequential family decisions. The person notices this. It is understood as a loss of standing, not merely a loss of hearing.

Competing and complementary mechanisms

The persistence of a direct effect after mediation adjustment indicates that non-psychosocial mechanisms contribute. Four warrant consideration. The cognitive load hypothesis holds that degraded auditory input requires greater cognitive resource allocation to speech comprehension, depleting resources otherwise available for memory encoding and executive function, and producing chronic fatigue that is itself depressogenic (Rutherford et al., 2018; Dawes et al., 2015). The cognitive decline pathway holds that hearing loss contributes to cognitive impairment, which independently elevates depression risk, and hearing loss is now recognised as among the more substantial potentially modifiable dementia risk factors (Livingston et al., 2020; Brewster et al., 2021). Neurobiological accounts propose shared substrate, with auditory deprivation producing structural and functional change in temporal and limbic regions implicated in mood regulation. Finally, common cause confounding must be considered, since vascular disease, diabetes and general frailty independently elevate risk of both sensorineural hearing loss and late-life depression, and inadequate adjustment for these would inflate the observed association.

Intervention Evidence

Why randomised evidence matters here

Observational mediation analysis, however well conducted, cannot establish that intervening on hearing will change depressive outcomes. The Shandong analysis was cross-sectional, meaning that hearing loss, loneliness and depression were measured simultaneously and the assumed temporal ordering was imposed by theory rather than demonstrated by design. Bias in cross-sectional mediation analysis is a recognised methodological problem (Maxwell et al., 2011). Randomised intervention evidence is therefore the appropriate test, and it has become available only recently.

The ACHIEVE trial and its secondary analyses

The Aging and Cognitive Health Evaluation in Elders study randomised 977 community dwelling adults aged 70 to 84 years with untreated, predominantly mild to moderate hearing loss to either a best practice hearing intervention comprising audiologist fitted hearing aids, assistive devices, counselling and ongoing support, or to a health education control addressing successful ageing. Follow-up was three years across four sites in the United States (Lin et al., 2023; Deal et al., 2018; Sanchez et al., 2020). The primary cognitive outcome was null in the total cohort (Lin et al., 2023). A prespecified sensitivity analysis found that effects differed between the two constituent study populations, with a 48 percent reduction in cognitive decline in the subgroup of 238 participants drawn from an ongoing cardiovascular cohort, a group at higher baseline risk (Lin et al., 2023). Interpretation of this subgroup finding requires caution given its size and post hoc character, and commentary has noted this limitation alongside the relatively short follow-up period.

The social outcomes are more directly relevant to this review. A prespecified secondary analysis examined social isolation, measured by the Cohen Social Network Index, and loneliness, measured by the UCLA Loneliness Scale, over the three-year period. Participants receiving the hearing intervention retained a mean of one additional person in their social network relative to control, and demonstrated positive effects on social network diversity, network quality and loneliness measures (Reed et al., 2025). At baseline, loneliness prevalence was higher among those with moderate or greater hearing loss at 69 percent than among those with mild loss at 64 percent. These findings

support the mediation model directionally. Intervening on hearing produced measurable improvement in both the structural and the subjective dimensions of social connection, which is what the model predicts (Reed et al., 2025). It is worth noting that the effect on network size, one additional person retained over three years, is modest in absolute terms, consistent with the general observation that effect sizes throughout this literature are small.

Direct evidence on depressive outcomes

A randomised controlled trial conducted in China tested community health worker delivered over the counter hearing aids in older adults with mild to moderate hearing loss, with depressive symptoms as the primary outcome (Jiang et al., 2025). The intervention reduced depressive symptoms, with parallel improvements in communication function, social isolation and loneliness. Approximately 80 percent of participants maintained more than four hours of daily hearing aid use, and no adverse events were reported. Two features of this trial are important for low and middle income contexts including Pakistan (Jiang et al., 2025). First, the devices were over the counter rather than individually audiologist fitted, addressing the cost barrier that places conventional hearing aids beyond the reach of most older adults in such settings (WHO, 2021). Second, delivery was through community health workers rather than specialist audiologists, addressing the workforce barrier that arises from the concentration of audiology capacity in a small number of urban centres (WHO, 2021). This is a delivery model that could plausibly be adapted to Pakistan's existing Lady Health Worker infrastructure, and represents the single most transferable finding in the current literature.

What intervention evidence does not yet show

Honesty about the limits is warranted. No trial has yet formally tested whether the effect of hearing intervention on depression is mediated by loneliness, which would require measurement of the mediator at an intermediate timepoint and appropriate causal mediation analysis. Effect sizes remain small across all outcomes (Chisolm et al., 2007; Ferguson et al., 2017). Follow-up periods are short relative to the decades over which age related hearing loss and its psychosocial sequelae develop. And no trial has been conducted in South Asia, meaning the applicability of these findings to Pakistani social structures, in which household composition and intergenerational contact differ substantially from the North American and Chinese settings studied, is assumed rather than demonstrated.

IV. DISCUSSION

The Pakistani Context

Pakistan had approximately 15 million people aged 60 and above in 2019, representing around 7 percent of the total population, with projections indicating expansion to approximately 40 million by 2050 (United Nations Department of Economic and Social Affairs, 2022). The country therefore faces a compressed demographic transition without the geriatric care infrastructure that wealthier ageing societies developed over a longer period. There is no national ear and hearing care programme, no population level hearing screening for older adults, no public subsidy for hearing aids, and a severely limited audiology workforce concentrated in major urban centres.

Available Pakistani evidence

Depression prevalence in Pakistani older adults appears substantial though estimates vary widely with sampling and instrument. A population based study in Karachi using multi-stage cluster sampling and the 15-item Geriatric Depression Scale among 953 participants found prevalence of 40.6 percent, with a marked gender difference of 50 percent in women against 32 percent in men. In the same study, older adults not living with a spouse were 60 percent more likely to be depressed, and those who did not regard their children as future support were twice as likely to be depressed (Bhamani et al., 2013). Earlier Karachi work had already reported substantial prevalence and identified family structure as a correlate (Taqui et al., 2007; Ganatra et al., 2008). A separate Karachi study using convenience sampling among 284 community dwelling older adults reported 16.5 percent depressed with a further 23.6 percent suggestive of depression (Mubeen et al., 2012). A geriatric morbidity study of 1,200 Karachi residents with a mean age of 68.7 years reported that 51.8 percent screened positive for depression (Sabzwari et al., 2019). Hearing specific Pakistani evidence is thinner. A cross-sectional study conducted in three public sector hospitals in Lahore examined 200 adults aged 53 to 89 years with hearing impairment, using the Kessler Psychological Distress Scale (Kessler et al., 2002) and the Satisfaction with Life Scale, and concluded that early diagnosis and rehabilitation of age related

hearing loss improves quality of life (Niazi et al., 2020). A multi-centre study of older adults with self-reported hearing loss found high levels of hearing handicap in 89.5 percent of participants (Zahra et al., 2021; Ventry & Weinstein, 1982), with sensorineural loss predominating. An audiometric study of 400 participants aged 12 to 70 in Rawalpindi and Islamabad found that 18 percent had some degree of hearing loss, with age of 60 years or above and occupational noise exposure emerging as independent predictors, and sensorineural loss accounting for 60 percent of cases (Ahmed et al., 2025). That study is not indexed in the major international databases, which is itself indicative of how thin and dispersed the national evidence base is.

A measurement problem that should be flagged

The same Karachi geriatric morbidity study that reported depression in 51.8 percent of participants reported hearing loss in only 8 percent (Sabzwari et al., 2019). This figure is not credible against a global estimate that over 25 percent of adults above 60 have disabling hearing loss (WHO, 2021), and against age specific estimates for age related hearing loss well above 50 percent in those over 70. The discrepancy is almost certainly explained by ascertainment method, since the study relied on self-report rather than audiometry. This is not a peripheral observation. It indicates that hearing loss in Pakistani older adults is substantially under-recognised, and that the under-recognition is systematic rather than random (Sabzwari et al., 2019; WHO, 2021). It has three consequences. Epidemiologically, the true burden is unknown and current figures cannot support planning. Clinically, older adults presenting with withdrawal and low mood are likely being assessed for depression without any evaluation of hearing status, meaning a treatable contributory factor goes undetected. Methodologically, any Pakistani study of the hearing loss and depression relationship that relies on self-reported hearing will produce estimates of unknown validity.

Contextual factors that may modify the pathway

Several features of Pakistani social organisation may alter how the mediation pathway operates, and none has been empirically examined. The prevalence of extended and joint family living means older adults typically retain high objective social contact, which would produce low scores on structural isolation measures irrespective of hearing status (Taqui et al., 2007; Mubeen et al., 2012). If the pathway runs principally through loneliness rather than isolation, as the Chinese evidence suggests, the effect could be preserved or even amplified in this setting, since the experience of being surrounded by conversation one cannot follow is arguably more acute than solitude. Gender is a second consideration. Pakistani women's social networks are frequently more household bounded than men's, and the Karachi data showing substantially higher depression prevalence in older women intersects with meta-analytic evidence that the hearing loss and depression effect size is moderated by the proportion of female participants (Xu et al., 2024). Third, stigma associated with visible hearing aid use, and the framing of hearing loss as an unremarkable feature of ageing rather than a treatable condition, plausibly depress help seeking. Fourth, cost is prohibitive, since hearing aids are an out of pocket expense in a system without coverage. None of these propositions has been tested in Pakistan, and each is a researchable question.

Research Gaps and Recommendations

Gaps in the international evidence

Four gaps constrain the field internationally. Most mediation evidence is cross-sectional and therefore cannot establish temporal ordering among hearing loss, loneliness and depression (Maxwell et al., 2011; Ye et al., 2022). Many studies conflate social isolation with loneliness or measure only one, precluding the comparison that the evidence indicates is decisive (Shukla et al., 2020; Holt-Lunstad et al., 2015). No randomised trial has formally tested mediation with intermediate mediator measurement. And the evidence base is drawn overwhelmingly from high income and East Asian settings, with South Asia effectively absent.

Gaps specific to Pakistan

No Pakistani study has used audiometric ascertainment of hearing loss together with validated depression and loneliness instruments in the same older adult sample. No population based estimate of age related hearing loss prevalence in Pakistani older adults exists. No study has examined the mediation pathway in a South Asian family structure. No intervention study has tested hearing rehabilitation with mental health outcomes. And no validated Urdu translation of the UCLA Loneliness Scale or the Lubben Social Network Scale appears to be in established use, which is a prerequisite for any of the above.

Table III: Priority Research Gaps with Recommended Designs and Feasibility Appraisal for the Pakistani Context

Gap	Recommended design	Feasibility considerations
No audiometric prevalence estimate in Pakistani older adults	Community based cross-sectional survey with portable pure tone audiometry, minimum 500 participants aged 60 and above	Requires audiometer access and trained operator; achievable through partnership with an ENT department
Mediation pathway untested in South Asian family structure	Cross-sectional mediation study using PTA, GDS-15, UCLA Loneliness Scale and Lubben Social Network Scale with bootstrap analysis	Most tractable design for a postgraduate project; directly replicates established methodology
No validated Urdu loneliness or social network instruments	Translation and cross-cultural validation study following established forward and back translation protocol	Publishable as a standalone psychometric paper and enables all subsequent work
Temporal ordering unestablished anywhere	Longitudinal cohort with a minimum of two follow-up waves	Resource intensive; appropriate for institutional or funded programme rather than individual project
No intervention evidence in low resource South Asian settings	Pilot randomised trial of low cost amplification delivered through Lady Health Worker network with depression and loneliness outcomes	Requires funding and ethics infrastructure; strong candidate for external grant application

Recommendations for practice

Four actions do not require new research to justify. First, hearing screening should be incorporated into geriatric assessment protocols in Pakistani primary and secondary care, since assessing an older adult for depression without establishing hearing status risks attributing to mood a withdrawal that is sensory in origin. Second, mental health professionals working with older adults should be trained to recognise hearing loss as a differential and contributory consideration, an educational gap that psychology curricula are positioned to address. Third, communication partner training for family members should accompany any hearing rehabilitation, since the evidence indicating that loneliness rather than structural isolation carries the pathway (Ye et al., 2022) implies that changing how families communicate with an affected member is as consequential as amplification (Chisolm et al., 2007; Ferguson et al., 2017). Fourth, hearing rehabilitation should be paired with structured social re-engagement rather than delivered as device fitting alone, for the same reason.

Recommendations for policy

Pakistan has no national ear and hearing care strategy. The World Health Organization has set targets for 2030 including a 20 percent relative increase in effective coverage (WHO, 2021) of adults with hearing loss using hearing technology, against which Pakistan currently has no baseline measurement and therefore no capacity to report progress. The economic argument for action is favourable: global modelling indicates that an additional annual investment of under 1.40 United States dollars per person to scale ear and hearing care would return approximately 16 dollars for every dollar invested over ten years (WHO, 2021; Chadha et al., 2021). Establishing a national baseline through audiometric survey is the necessary first step, since a condition that is not measured will not be budgeted for.

Limitations

This review is narrative rather than systematic, without formal risk of bias assessment or quantitative synthesis, so selection bias in the identified literature cannot be excluded. The mediation evidence on which the central argument rests derives principally from a single large study conducted in one Chinese province, and replication in other settings is limited. Reliance on English language sources may have excluded relevant regional material. The Pakistani literature identified is small, methodologically heterogeneous and drawn disproportionately from Karachi and

Lahore, limiting generalisability to rural populations who constitute the majority of Pakistani older adults. Finally, the intervention literature is developing rapidly, and findings published after May 2026 are not reflected here.

V. CONCLUSION

Hearing loss is associated with depression in older adults, but the association is smaller than its prominence in the literature suggests, and it attenuates substantially in longitudinal relative to cross-sectional designs. Approximately half of the total effect is mediated through social disconnection, and the mediation is carried predominantly by subjective loneliness rather than objective social isolation, at a ratio of roughly five to one. Randomised evidence now demonstrates that hearing intervention improves social network size, network quality and loneliness, and that low cost amplification delivered through non-specialist community workers reduces depressive symptoms. The practical conclusion follows from the mediation finding rather than from the association itself. Because the pathway runs through the felt quality of connection rather than its measurable quantity, hearing rehabilitation conceived narrowly as device fitting is unlikely to be sufficient. What the evidence supports is a combined intervention: restoring auditory access, training the people around the affected individual to communicate differently, and structuring re-entry into social participation that has often been avoided for years before help was sought. For Pakistan the position is more elementary. A country with 15 million older adults today and 40 million projected by 2050 has no population level measurement of hearing loss in that group, produces prevalence estimates from self-report that are implausible by an order of magnitude, and has no validated instruments in Urdu for the mediating constructs concerned. The research agenda therefore begins not with sophisticated mediation modelling but with measurement. Instrument validation and audiometric prevalence estimation are unglamorous, entirely tractable within the resources of a postgraduate project, and are the prerequisite for everything that follows.

Disclosure Statement

No potential conflict of interest was reported by the authors.

Funding

The author received no funding from any organizations.

VI. REFERENCES

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