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Three cases of hearing impairment with surprising subjective improvements after prayer. What can we say when analyzing them?

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ABSTRACT

Aim: to enhance the understanding of documented mismatches between 'subjective' experiences and 'objective' data in three cases of self-reported instantaneous healing of hearing impairment upon prayer.
Method: description of three cases taken out of a larger retrospective case-based study of prayer healing in the Netherlands. In this larger study multiple reported healings were investigated using both medical files and patients' narratives through in-depth interviews. A subset of three cases with dramatic subjective reduction of hearing impairment upon prayer was studied. These patients underwent extensive additional investigations at the audiology center of the Amsterdam University Medical Centre. All data was evaluated by an interdisciplinary medical assessment team, subsequent analysis was transdisciplinary.
Results: the three case histories with self-reported healing after prayer demonstrated a clear mismatch between subjective experiences and objective findings. No measurable improvements were found in four different audiological testing methods. However, in-depth interviews, hetero-anamnesis and a validated questionnaire all confirmed the healings. The medical assessment team could not label these healings as 'medically remarkable' because of absence of measurable 'objective' changes, but they did consider them as 'remarkable in a broader sense'. On expert consultation no equivalents of mismatches to this extent could be found. The healing experiences of our participants involved their entire being with profound positive effects in different domains of their lives, and a perception of a benevolent God who acted upon them. There was a distinctive pattern, labelled by the participants as a healing of mind, soul and body.
Conclusions: The subjective-objective incongruities that were found were not well understood. We noticed a paradox: the 'objective' measurements did not reflect hearing abilities in daily life where-as 'subjective experiential' data did. The latter could be 'objectified' and validated in various ways. In fact, a rigid distinction between 'objective' and 'subjective' was not relevant here, nor a hierarchy among them. A model leaving room for different causations (horizontal epistemology) complied best with the multi dimensionality we came across.

Introduction

A wider study on prayer healing took place in the Netherlands,[1] which studied multiple reported healings upon prayer (*see under methods*). Despite secularization the subject continues to attract considerable interest from the public. Do remarkable or unexplained healings take place? If so, how can we understand such healings?

During their investigations the research team was confronted three times by a report of instantaneous and dramatic subjective reduction of hearing impairment without significant changes in

Copies of relevant medical reports underlying our analysis can be requested for, either in Dutch or English language.

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audiometric measurements. In audiology discrepancies between subjective experiences and objective data were reported,[2] but not to the extent we found. Due to this apparent knowledge gap we decided to further look into this phenomenon.

We will present the three cases with instantaneous improvement of impaired hearing upon prayer. They have been taken from the larger study. Our objective in this article is to address the mismatches between measurable outcomes and subjective experiences, aiming at a further understanding of this discrepancy.

Hearing and listening: a short background

The prevalence of hearing impairment in the western world, with an average pure-tone hearing loss of at least 40 decibel (dB) in the best ear (averaged across 0.5, 1, 2 and 4 kHz), is estimated to be 4.9% for males and 4.4% for females.[3] Normal speech has a loudness of 50 dB and so a loss of 40 dB can significantly hamper communication. Hearing loss can be conductive, at the level of the auditory canal and the middle ear (e.g. chronic middle ear infection), perceptive, when located in the inner ear, the acoustic nerve, the brain (e.g. presbycusis), or mixed (conductive and perceptive loss combined).

There is a phrase stating that *we hear with our ears, but we listen with our brain.* This is reflected in modern day audiology which distinguishes between bottom-up and top-down processes in auditory perception.[4] *Bottom-up perception* starts with the conduction of sound through the outer ear and the middle ear, where the ossicles set in motion the cochlear fluid of the inner ear. The organ of Corti in the inner ear is transducing these sound vibrations into neural signals, which subsequently are transported along the acoustic nerve to the brain stem. The brain stem will then distribute signals to the cerebral cortex. This is where *top down processing* starts, using bottom-up information along with available knowledge (e.g. language ability) and cognitive processes (working memory, attention). In fact auditory perception is a continuous interplay between these bottom-up and top-down mechanisms.[5]

However, as much as is known about bottom-up pathways, the adverse is true for top-down processing. Functional neuroimaging studies consistently find that intelligible sentences are processed by the bilateral temporal cortex, frequently complemented by activity in the inferior frontal gyrus. These regions form a functional hierarchy, with regions nearer to the auditory cortex showing increased response to acoustic features, and regions further removed manifesting more acoustic invariance.[6] Other regions in the brain turn out to be more active when confronted with acoustically degraded speech.[7] This is relevant for people with impaired hearing, as they face this problem on a daily basis. In fact there is converging evidence from multiple sources that cognitive resources are required to understand degraded speech: neuroimaging measures of brain activity,[8] physiological responses[9,10] and behavioral evidence.[11]

Understanding cognitive processing has practical implications as well. It is well established that individual differences in speech understanding remain even after factoring out audiometric measures.[12] A growing number of studies affirm the important role of cognitive factors in explaining these individual differences.[13]

Another relevant issue is the interplay between hearing loss, cognition and socio-psychological factors. First of all recent work suggests that persons with hearing loss may be at increased risk of fatigue, in part due to effortful listening that is exacerbated by their hearing impairment. They require more time to recover from work and have more work absences.[14] Pichora-Fuller et al examined epidemiologic evidence linking hearing loss to cognitive declines and other health issues. They found a reciprocal relationship between social factors and auditory and cognitive aging.[15]

Hearing loss can be measured both ‘objectively’ (audiometry) and ‘subjectively’ (validated questionnaires). Discrepancies between these testing methods do occur.[2] As noted above individuals may use compensatory top-down mechanisms to improve ‘subjective’ hearing: cognitive and language abilities, verbal working memory, listening effort. These mechanisms become more relevant when listeners are faced with degraded speech, as is certainly the case with impaired hearing. A Framework for Understanding Effortful Listening (FUEL) was proposed to describe the elements which are involved.[16]

There is more to hearing than the results of ‘objective’ testing methods.

Methods

At the Vrije Universiteit, Amsterdam, and the Amsterdam University Medical Centre, location VUmc, a study research protocol was designed to investigate reports of healing upon prayer.[1] The study itself was retrospective and case-based. Reported instances of prayer healing were investigated systematically. Between February 2016 and March 2020 multiple cases were identified and evaluated by an interdisciplinary medical assessment team, using both medical and experiential data.

Three of the cases related to hearing impairment, these were the focus of our study for this article. The methods we used to gain insight into these three healings are listed in Table 1.

The research team advocated a naturalistic approach, attempting to understand subjects in their own environment.[17] This was emphasized as the patients presented in this article commented on draft versions of the text (participatory member check[18]).

The Amsterdam inventory (AIADH) is considered to be reliable and valid.[20,21] Each question has a- and b- sub questions and is accompanied by an explanatory picture. Performances are indicated on a 4-point scale. Eventually a multidimensional subjective auditory functioning profile is compiled after scoring the items. In this study the AIADH was filled in twice, for the situation before and after healing.

Each individual's hearing loss was indicated in decibels (dB) as the average pure-tone threshold (averaged across 0.5, 1, 2 and 4 kHz).

Results

Case presentation: three histories of impaired hearing and their healing

We will present the cases under fictitious names: Esther, Deborah and Mary. The audiological data are summarized in Table 2. Their narratives, based on the in-depth interviews and phenomenological analysis, are reflected individually. The same applies for medical data additional to Table 2, as well as for the hetero anamnesis.

Case history 1: Esther, born in 1977, with congenital hearing loss

Additional medical data

Esther is a female, born in 1977. Impaired hearing was discovered at the age of 5 years, diagnosed as bilateral perceptive hearing loss (HL). During childhood Esther received hearing aids, causing good improvement of speech understanding. But she refused to use them as from adolescence, only restarting in 2005. In 2013 she experienced a sudden and dramatic improvement when prayed for during a prayer healing meeting at a campsite.

At our request Esther underwent audiometric testing after healing, in 2018. As shown in Table 2, her audiometric thresholds had not changed. Beforehand she expressed doubts about testing and for some time it caused confusion. Nevertheless she remained aware of the fact that her subjective hearing as well as her entire functioning were still completely different from before.

Esther's narrative

A teacher at school was the first one who noticed that Esther had a hearing problem.

She explained about her youth:

Table 1
methods used in studying three prayer healing reports of hearing impairment.

Mode of investigation	Description
Medical assessment	A medical assessment team, consisting of five medical consultants and a general practitioner reviewed the full medical files. They were assisted in their discussions by other disciplines (philosophy, theology, experiential knowledge) where relevant. Apart from the medical files the assessment team received the results of the other modes of investigation as well.
In depth interviews	The second author, a senior researcher at the University department of Medical Humanities (EB) conducted in depth interviews according to a topic list, to gain insight into people's perceptions of their healing experiences. The interviews were recorded and written out verbatim, a report was made.
Hetero anamnesis	The first author (DK), a general medical practitioner, took a hetero anamnesis of persons near to the respondent, asking them about their observations of hearing impairment before and after healing.
Additional audiometric testing	The three participants were reviewed at the audiology department of the Amsterdam University Medical center. They received additional testing: speech understanding both in quiet and in noise as well as spatial speech understanding. These investigations were performed and interpreted by the same specialist audiologist.
Validated questionnaire	The Amsterdam inventory for auditory disability and handicap (AIADH)[19] was administered. It consists of 30 questions, dealing with a variety of everyday listening situations and covers five factors, interpreted as basic auditory disabilities: distinction and detection of sounds, intelligibility in noise, localization of noise, intelligibility in quiet.

Table 2
overview of the audiological data. (HL = Hearing Loss).

	Esther, female, born 1977	Deborah, female, born 1963	Mary, female, born 1956
Diagnosis, date of diagnosis	Congenital perceptive bilateral HL, discovered at 5 years of age	Mixed hearing loss (conductive and perceptive) after an ear infection in 1967	Presbycusis, 2014
Medical history of hearing loss (HL)	Throughout life intermittent use of hearing aids	Mastoidectomy 1967, reconstructive middle ear surgery 1976 (anvil replaced)	Bilateral hearing aids from 2014
Audiometry before healing	2005 average HL 45 dB for both ears	1976 left ear 40 dB HL (surgery had no effect)	2014 average HL 45 dB for both ears
Date of prayer, healing experience	Summer 2013, instantaneous healing at a prayer healing meeting	October 2006, instantaneous healing of disabilities upon a liturgical prayer in a Roman Catholic monastery, healing of HL 2 weeks later	March 2016, instantaneous experience after a desperate own prayer, all medical conditions healed at short intervals, including HL
Audiometry after healing	2018 right ear 50 dB HL, left ear 45 dB HL	2016 left ear 50db HL, right ear 20dB	2016 average HL 40 dB for both ears
Other medical conditions	None	Disabilities due to longstanding pelvic instability	Multimorbidity (see under additional medical data)
Outcome	Hearing aids no longer needed	Good hearing left ear subjectively	Hearing aids no longer needed

"They often said to me 'you never listen' while I was definitely keen to listen. Or 'why are you late again?' when I was called for a meal, despite always leaving the door of my room open to see if someone was moving. Therefore it was a relief when I received a hearing aid. For the first time I could hear the birds!."

At university she trained to become a social worker, and together with her husband she started an open house in the center of a city to offer shelter, charity and to share their faith.

'I did a lot of the listening by lip reading. Working for 2,5 hours was the maximum, then I had no energy left.'

In 2013 she visited a Christian prayer healing meeting at a campsite where she decided to go to the front to be prayed for.

'My ears popped open when the pastor asked for the deaf spirit to leave and I could immediately hear sounds much louder. I could just hear the words of the hymns we were singing. It was overwhelming, so beautiful and so big! Back from the meeting I was crying. That week I stayed in a tent. At night it was silent, but now I heard all sorts of sounds. I had to ask my husband what it was, like someone walking with flip flops on the gravel. And I could hear it when I rubbed my clothes.'

Back from the meeting she visited her family doctor. He noticed the difference, direct eye contact was no longer needed as before when communicating. She described her changes in functioning:

'I can now work for 9 hours at a stretch without thinking about my hearing. But it is not as it was initially after my healing, when I heard each and every sound. This is a search for myself as well, because it still differs from the period of my hearing problems. And my social functioning is so much easier now.'

When asked for the meaning of her healing Esther says:

'Most important for me is that God is delving deeper. It is not just a physical healing, but it is also at the level of the soul. He is touching the person, it is a relationship, you see that in the Bible as well. God is getting close, not just a doctor performing an operation'.

Hetero anamnesis of Esther's husband

Her husband testified to the above change, notably the changes at the campsite after her healing.

In daily life he can now say something to her at a distance. Before she had to come closer to him in order to understand. She also hears him when her back is turned and she is able to follow a conversation among a number of people inside a room (e.g. with their children in the living room).

Beyond this, she also has much more pleasure in making music!

Case history 2: Deborah, born in 1963, with one-sided hearing loss (and pelvic instability)

Additional medical data

Deborah underwent a mastoidectomy of the left ear in 1967 because of an infection. Later on, a school doctor found that she was not hearing well with that ear when she was 8. In 1976 reconstructive middle ear surgery was conducted.

It should be noted that the audiometry testing before healing, reflected in Table 2, was done prior to middle ear surgery. She had a mixed hearing loss. A pure-tone threshold of 40 dB HL was found at the left ear. Aided speech intelligibility was 63% after significant

amplification. She sensed a temporary improvement after surgery, which disappeared in the course of time. At this stage there was no follow-up.

Audiometry testing conducted at an audiology center much later, in 1991/1992, showed that there had indeed been no improvement after surgery (a copy of that investigation could not be traced, this information was recounted by the patient).

In 2006 Deborah experienced an instantaneous cure of debilitating pelvic instability when hearing a prayer in a Roman Catholic monastery, although she had not requested prayer healing at all.

There was another surprise two weeks later: she noticed that the hearing loss in her left ear had suddenly disappeared. Since then she hears adequately when someone whispers in that ear, the same is true for using the phone. As a participant of our study we requested her to undergo audiometry in 2016 again. The results demonstrated a threshold of 50 dB in the left ear and 20 dB in the right ear (20 dB is considered normal hearing at that age). She was very surprised once more when understanding that the left-right asymmetry was still unchanged. The audiologist prescribed a hearing aid for the left ear, which she hardly used.

Deborah's narrative

Although her one sided hearing loss must have started at the age of 4 years, when she had the ear infection, it was only diagnosed by the school doctor years later. Deborah said that she had adapted to circumstances, mostly by teaching herself lip reading. She used these compensatory mechanisms until 2006.

Then she spent a weekend at a monastery, not with an intention to be healed from pelvic instability or impaired hearing. At the end of an inspiring weekend the priest said a standard prayer:

> 'God the Father, God the Son, God the Holy Spirit. You only have to speak one word and my body is healed. Speak, Lord… You only have to speak one word and my soul is healed. Speak, Lord… You only have to speak one word and my spirit is healed. *Speak, Lord…'*

> *'And then, before I could think, I felt like I was being touched from the outside. A hand touched something in my head, my brain. And then a current started from my toes gradually running upward in my body, a wave of power, I could feel it in my fingertips as well. I was stunned. And I just started crying, as if a tap was opened right next to my head, where I was touched. And it continued to pour, it didn't stop.'*

> *'I could hardly talk about it, too difficult to express in words. Am I healed? Can that be true? I felt no more pain'*

Indeed all physical symptoms and reduced validity from pelvic instability had disappeared instantaneously. Except for the left sided hearing loss.

But 2 weeks later during a nap at noon:

> *'I used to sleep by putting the pillow on my good ear, so I did not hear a sound. But that afternoon, when I was lying down, I heard the neighbor talking near to my window. So I thought I should re-apply the pillow to the right ear. But again that didn't work. Then it came to my mind that I could now hear with my left ear as well! I was amazed. I started ringing my friend, holding the phone to my left ear, and I could communicate with her, this was impossible before!'*

She went to a music performance at the concert hall:

> *'We were seated in the third row from the front, the orchestra started playing, and I started crying and crying. From my childhood I had loved music, but now I could hear it with both my ears, the experience was so different.'*

> *'Therefore, I still don't understand the tests, with the audiometry still indicating hearing loss in the left ear. So it remains a big question to me what has happened to that ear'.*

Hetero anamnesis of Deborah's sister

Her sister was most impressed by the healing of her motoric invalidity, as she was largely bedridden at the time. Deborah was good at hiding things, compensating for her defects, so the hearing loss did not stand out.

What struck most in this respect was that she often went to concerts after her healing experiences, being very enthusiastic about the beauty of the music she had heard.

Case history 3: Mary, born in 1956, with multimorbidity and hearing loss

Additional medical data Mary was severely premature at birth after only 26 weeks pregnancy. In the course of time there has been an accumulation of diseases and problems: with low vision starting in her youth due to high oxygen treatment postnatally and hypothyroidism after strumectomy for Graves' disease at the age of 16 years. In adulthood she contracted multiple diseases: asthmatic bronchitis with frequent hospital admissions; debilitating inflammatory osteo arthritis with braces for both hands and the left knee, causing chronic pain as well; impaired hearing, vertigo and tinnitus; osteoporosis; an ankle fracture in 2015; depressions; divorce; incontinence of urine after a traumatic delivery; hypercholesterolemia and overweight. Additionally there were surgical procedures: caesarean section, cholecystectomy, hernia repairs, a TOT procedure for incontinence.

Eventually there was an impressive polypharmacy: she had 18 medications resulting in at least 25 tablets daily and 3 different modes of inhalation treatment, combined with oxygen.

She became increasingly disabled. Always coughing up sputum, shortness of breath, having pain. When walking she often used a crutch, the maximum was 400 m. At home it was necessary for her to use various tools to do the household chores. In December 2015 Mary was considered to be 100% incapacitated for any work. Then one night in March 2016 she had a very powerful and unexpected experience after a desperate prayer. To her surprise all illnesses disappeared subsequently. She did not cough anymore. There was no more pain, she could walk distances of 4–5 km. A few weeks later she noticed that she could hear well without hearing aids. All medications were stopped in the course of 2016 except for levothyroxine. In July the pulmonologist specified in a letter that Mary felt very well, having experienced healing by God. Despite having stopped all of her asthma medications there was no recurrence of symptoms and no decrease of pulmonary function.

Mary's narrative

In 2016 she was a member of a Baptist church, where people would pray for each other.

But on that specific night in March 2016 she was at home on her own, being desperate, when she started to pray*:*

> *'And then I sat there with my pills and the nebulizer on the bedside table. Thinking I don't want to live like this anymore, I 'd rather die. Then I started praying, going down on my knees, and I said – Lord, please take me Home, because I don't want to go on. I don't want a life like this, I can't stand it anymore. Then I started crying and I said – if You still want to do something in my life, then do it, because I believe in You. And I still have that calling … (meaning missionary work in South America).' 'I was still desperate and emotional when I sensed a silence around me. And that silence was enormous, it came within me, as if someone wrapped a blanket around me. Then I experienced a deep sense of being accepted: I can be!'*

The next morning she woke up without pills and without her nebulizer, lying half out of her bed. The following days, she remained without pain, without a cough and walking more easily, starting to realize that maybe something had happened to her illnesses after the

Table 3
results of the AIADH a-questions. Means of the factor scores, measuring abilities in hearing, are shown. Interpretation of the marks 0 – 3: 0=almost always heard; 1=often heard; 2=sometimes heard; 3=almost never heard. Higher scores indicate worse outcomes.

	Case 1, Esther		Case 2, Deborah		Case 3, Mary	
	Before healing	After healing	Before healing	After healing	Before healing	After healing
Speech intelligibliity in noise	1.0	0.4	1.5	0	1.3	0.1
Speech intelligibilityin quiet	2.6	0.9	1.8	0	1.2	0.2
Auditory localization	1.6	0.2	2.0	0.2	1.0	0.2
Detection of sounds	1.9	0.5	1.3	0	0.8	0.2
Distinction of sounds	0.2	0.1	1.4	0	0.8	0.2
On average	1.5	0.4	1.6	<0.1	1.1	0.2

Table 4
results of the AIADH b-questions, measuring the degree of handicap due to limitation in hearing. The interpretation of the marks 1–4: 1=no handicap; 2=mild handicap; 3=moderate handicap; 4=severe handicap. Higher scores indicate worse outcomes.

	Case 1, Esther		Case 2, Deborah		Case 3, Mary	
	Before healing	After healing	Before healing	After healing	Before healing	After healing
On average	33/13=2.54	1	25/16=1.56	1	20/10=2.0	1

prayer. She took off her braces and she decided to put it to the test, praying to God:

> *'Lord, if You have healed me, then I will stop medications for two weeks and I will go to the doctor. I will restart when symptoms recur'.*

But symptoms did not recur and medications were phased out. About her hearing she said:

> 'Everyone seemed to yell and music sounded so loud . . .. So I took off my hearing aids, I heard the birds singing and the clock *ticking and I realized my hearing had been healed as well'.*

Soon afterwards she went to South America for some time to help missionaries in Peru.

Hetero anamnesis of a good friend

When asked he found it difficult to say something specifically about hearing as it was only one problem out of many. But he had certainly observed an improvement in her entire functioning, hoping for her it will stay like that.

Review at the Amsterdam University Medical Centre, location VUmc, department of audiology

All three respondents agreed to participate in further investigations at the audiology department, consisting of more detailed audiological examinations as well as questionnaires on subjective functioning of hearing.

Additional audiological examinations

They were all examined by the same specialist audiologist and all underwent the same tests. A summary of the test results was written by the audiologist, who reported as follows:

> 'Two patients have bilateral perceptive hearing losses at present with clearly reduced results when testing speech understanding in quiet, speech understanding in noise and spatial speech understanding. The latter is a test reflecting 'daily life functional hearing'.

These two patients assess their hearing remarkably more favorably in comparison with audiometric and speech test results.

Deborah has a serious mixed hearing loss in the left ear and a normal, age-related hearing loss in the other ear. Speech tests demonstrated reduced scores for the left ear, being in line with her known condition. Results for the right ear were marginally normal.

For the first two patients it is highly unlikely that a change took place in peripheral hearing. In the case of the third patient, assessment is more difficult as there is no measurement data available from the period prior to the instantaneous improvement. Possibly a change of the conductive component could have taken place'.

The Amsterdam Inventory for Auditory Disability and Handicap (AIADH)

As noted before, our respondents answered the questions for their situations before and after healing. All three have an above average educational level, and could understand the questions well. Results are reflected in Tables 3 and 4.

It should be noted that there is no differentiation of factor scores. This is not relevant as no handicaps are experienced after healing.

The consulted expert in auditory functioning studied the profiles, reporting subsequently:

> *'In all three there is subjective improvement on all[5] factors of the questionnaire. For the patient with one sided hearing loss one would expect the worst results on the 'localization' factor. This is actually reflected in her profile (a-questions, Table 3). For the patients with bilateral hearing loss the b-questions (reflecting 'handicap', Table 4) ought to produce higher scores in comparison with one sided hearing loss. This is indeed the case. Therefore one may assume that the questionnaires were filled in honestly and consistently.*

Although the inventories were made up retrospectively the subjective auditory functioning of the respondents was systematically mapped.'

Concluding, one may say that the additional investigations confirmed the pattern of mismatches between subjective auditory functioning and objective data.

Medical assessment

After elaborative discussions the medical assessment team at the Amsterdam UMC decided that they could not label these healings of hearing impairment as medically remarkable or unexplained. The medical histories were indeed striking, but could not be objectified by the appropriate investigations such as audiometry and speech understanding tests.

However, every member of the team felt uneasy as all of them considered these healings remarkable when looking beyond the technical medical perspective. The audiological tests were solid and uniform, thereby emphasizing the observed incongruity between

subjective experiences and objective data. Subjective factors, what counts for the 'patient', were tested in three different ways: medical history including hetero anamnesis, in-depth interview, and a validated questionnaire. The objective assessment, what counts for the 'doctor', was tested in four ways: audiometry and three tests for speech understanding. The mismatch was demonstrated repeatedly.

It was decided to ask for expert opinion of a psychologist specialized in audiological functioning. Her expertise relates to determinants and consequences of hearing impairment as well as cognitive and behavioral factors influencing 'hearing and listening' (*see* also under that paragraph), having studied discrepancies between speech tests and self-reported hearing as well.[2] She indicated that she was aware of discrepancies, but not of the scale we had presented to her. The expert also commented on the filled out AIADH questionnaires (see under the paragraph *Review at the Amsterdam University Medical Centre*). Although questions were answered retrospectively, replies showed a consistent pattern, indicating credible subjective improvement on all factors of the questionnaire. Credibility further increased since the findings of the AIADH corresponded with the data of the in-depth interviews and hetero anamnesis.

In a study by Brown et al[22] in 2010 hearing thresholds were measured with a handheld audiometer before and after intercessory prayer for impaired hearing (and low vision) in rural Mozambique. A significant improvement was found across the tested population, although field conditions were challenging, as the authors say. It was also observed that 'several audition subjects showed no measurable improvement, despite self-reported improvement'. In 'Testing Prayer'[23] the same author describes some individual cases in an analysis of hearing data before and after prayer. Audiometric data showed impressive improvement in one of them (Martine). Two others (Gabriel, Maria) reported clear and detailed improvement of impaired hearing, while numerical changes in pre- and posttests were subtle. Although matches were prevailing in these studies, some of the cases apparently showed incongruities as well.

Summarizing our cases demonstrated documented mismatches between subjective and objective data, for which it is hard to find equivalents in literature. The assessment team maintained its conclusion of a remarkability, requiring additional investigation as to enhance our understanding.

Discussion

When analyzing our case histories we found a number of observations to be remarkable:

- The healings observed were instantaneous with strong physical sensations at that very moment.
- Subjective audiological functioning returned to normal. This was confirmed by the people around them, the interviews as well as the data of the questionnaire, but not by audiometry. In Esther's case the change was noticed by her husband and children on a daily basis. The mode of communication in the living room and at the dining table had vastly changed for the better.
- It is noteworthy that Deborah had not at all expected the audiometric data to be the same as before, she was astonished when she heard the results.
- Mary and Deborah did not have high expectations to be healed upon prayer initially, rather they were surprised when it occurred. Moreover, the nature of the prayers themselves could not be viewed as goal oriented interventions in all instances: for Esther it was when she visited a prayer healer; Deborah did not ask for healing specifically, but there was a passage in a liturgical prayer requesting healing of body, mind and soul; and in Mary's case the prayer was rather an outcry of despair. Very remarkably, Deborah experienced healing from two diseases and Mary from a multitude of them (multimorbidity). To make it even more confusing, the healing of these different medical conditions took place at differing moments. Although the onset of the healings was instantaneous, in the cases of Deborah and Mary healing of impaired hearing was only a few weeks later, at very unexpected moments.
- Apart from illnesses disappearing there was an exceptional shift in functioning: Esther now easily copes with a 9 h working day in social work, while only managing 2.5 hours at a stretch prior to her healing. Mary went to Peru to help others, while she herself had needed home care before.
- It was surprising as well to see that Mary was able to stop her medications in a few months' time: among them were potent drugs (hydroxychloroquine, prednisolone, anti-asthmatic inhalations with oxygen) as well as addictive drugs (oxycodone, fluoxetine, tramadol, codeine).
- The mismatches of subjective experiences and objective data were confirmed by expert investigations at the audiology center of the Amsterdam UMC (VUmc).

Due to their unusual presentation, it was hard to interpret these healings within a strictly medical framework. Rather we observed strong experiences involving the whole person, changing one's functioning at physical, psychological, social and religious levels. When looking at the cases of Esther, Deborah and Mary from this broader multidimensional perspective, we found some common features:

- To all three of them, it was a life-changing event, their lives before and after were very much different.
- There was instantaneous healing of physical functions, that could be verified, but not measured.
- The healing was accompanied by strong physical and emotional experiences.
- The self-interpretation of all three was a religious one: it was God, who acted, with a deep sense of a benevolent God.
- A renewal of their entire being took place, not just a physical healing of a specific medical disease. Mary described it as 'a healing to mind, soul and body'.
- Their orientation in life changed, with an increased focus on non-materialist aspects of life.

In scientific literature similar case histories and reports of instantaneous healing upon prayer can be found only incidentally.

Recently two case reports of healing after proximal intercessory prayer were published by Romez et al.[24,25] Although these articles focused mainly on medical data, the healings were instantaneous and accompanied by physical and emotional sensations as well, resembling our report. The same picture appeared for healings having taken place at the Lourdes pilgrimage site in France in quite a different era. Francois et al studied 411 patients cured in Lourdes in 1909–1914 and thoroughly reviewed 25 cures acknowledged between 1947 and 1976.[26] The authors remarked: 'In two cases out of three, the clinical cure was instantaneous. It was sometimes heralded by an electric shock or pains and, more often, a perception of faintness, or of relief, or of well-being. . .. More importantly, the cured patients exhibited a steadfast confidence they had been cured and gave strong testimony. Although subjective, this confidence has been considered by many observers as quasi-pathognomonic.'

In the Netherlands a case study on a healing of Parkinson disease was published[27] within the context of our research. The aforementioned book 'Testing Prayer'[23] gives quite some case descriptions as well, parallels can also be found in religious literature.[28–30]

Apparently the same type of multidimensional healing in conjunction with prayer occurs in different eras and in different cultural settings.

Poloma and Lee, two sociologists, did intensive research on religious experiences. In an article they summarize five cases.[31] All of

them reported that they experienced a touch by God, manifested by various sensations: a gust of wind, an appearance of the Mother Mary, a 'hand' on the head or on the back, a vision of 'Angels' or 'a rainfall of liquid love'. In their book, 'The Heart of Religion'[32] they reflect upon these experiences as 'An encounter with a divine energy that is profoundly loving and accepting beyond words, followed by a radical shift in which core values are turned upside down, resulting in insights that appear to rewire the person and their approach to life.' Although these accounts did not mention healings there is a resemblance with the life events in our case histories.

Could it be that there is a distinctive pattern for prayer healings associated with strong (religious) experiences, the same features frequently recurring? Our case histories as well as those in the articles mentioned above, seem to point in that direction.

When coming back to our research question, aiming at enhancing our understanding of the discrepancy we found between objective and subjective data within the context of prayer healing, we were aware of the fact that we did not have a closing answer.

Primarily, we were surprised by the data we found and we still are. We had not expected such incongruities, nor did the participants themselves. The surprise increased as we came across this phenomenon three times. There is no point in downplaying these data or trying to 'reason it away'. It may even be rude to do so, as all three participants were confronted with non-empathic disbelief. Rather we should acknowledge the events as we have observed them. It is better if our surprise turns into eagerness to learn more about these cases. For instance, why is it that our respondents do not experience obstacles in daily life functioning? Their audiometric measurements indicate hearing losses just over 40 dB, which should significantly hamper normal communication.

An intriguing question is whether top-down mechanisms (see *hearing and listening: a short background*) could be explanatory despite the fact that mismatches to this extent were not described before. As outlined in the *Hearing and listening* paragraph performances are influenced by cognitive and language abilities, verbal working memory, listening effort (attention). Some of these processes can improve through perceptual learning.[33] It refers to how experience and practice can change the way we perceive sights, sounds, smells, tastes, and touch. However, 'While it is well established that perceptual learning is an ubiquitous process in the adult brain, it is typically slow, and can require specialized training'. Therefore it is unlikely to explain the instantaneity of the changes in our respondents.

Another issue may be the effect of top-down influences on hearing when coinciding with strong emotional and existential experiences. Apparently not much is known here, it may therefore be a subject of further investigation.

Alternatively, can anything else be implied here beyond abnormal 'underlying' brain processes? When 'miracle-type' cures are reported there is a sense of unease in modern medicine with a dominant tendency to always hypothesize material causes as the explanation of such healings as well.[34] But in our cases this may not be relevant as the 'objective material' investigations fail to explain the current hearing performances. Why not turn to other explanatory frameworks 'beyond the brain'? Brown et al.[22,23] found significant improvements of impaired hearing in their studies on intercessory prayer. But it remains a question why some of their subjects had incongruities, to some extent similar as in our reports. Hypnosis studies did not demonstrate significant improvements in vision, according to a review article,[35] but studies of the kind were not found for impaired hearing.

Explanatory concepts include intention, nonlocality, extra-sensory perception, with nonlocality being the common denominator. In a nonlocal view consciousness acts beyond the brain in ways that transcend direct sensory contact between humans.[36] Research on Near Death Experiences[37] is suggestive of nonlocality.

Are such mechanisms involved here? Esther, Deborah and Mary viewed upon their experiences as acts of a benevolent God, being healed to mind, soul and body. Did mind and soul transcend the physical qualities of healing?

If not, then at least the consistent pattern of 'subjective experiences' of our respondents have some probing questions to ask to 'objective reality'.

Concluding remarks

In all three case histories regarding hearing there was an outspoken mismatch between subjective and objective findings. In-depth interviews, hetero anamnesis and a validated questionnaire confirmed the healings, but no measurable improvements could be found in four different audiological testing methods.

Esther, Deborah and Mary appeared to have undergone 'life-changing healing experiences' involving their entire being, with documented changes in many areas of their lives. Physical and mental functioning, the perception of a benevolent God, one's outlook on life as well as on the world around them.

Some important questions remain: Firstly, as for audiology, the gross mismatches we observed may be a trigger for further investigations. Could top-down mechanisms in audiological functioning be involved, and to what extent? Can this be investigated in situations after profound experiences?

Secondly, these healings could point towards a distinctive pattern in prayer healing with a number of features in common. There was a deep sense of a benevolent God, who acted upon them. Not just a physical change, but a healing to mind, soul and body. Does this pattern apply for other healings upon prayer as well, apart from impaired hearing? And will we find subjective-objective incongruities more often?

Finally, there is a conceptual issue at stake. These case histories do raise questions about mainstream biomedical models focusing on biological factors as an explanation for medical conditions, such as impaired hearing. Such models tend to emphasize 'objective' data. However, in this research we were confronted with an interesting paradox: the 'objective' measurements did not reflect hearing abilities in daily life, where-as 'subjective experiential' data did. Moreover, the 'experiential' findings could be 'objectified' and validated in various ways. What does it say about these concepts when looking at our case histories? Should we turn away from a linear and vertical epistemology in favor of a non-linear and horizontal epistemology?[38] In a horizontal epistemology there is no hierarchical distinction between 'objective' truth and 'subjective' opinions and the high-low distinction between 'rational' capacities and 'irrational' emotions and intuitions. It leaves room for different causations: audiological top-down factors, experiences and religious aspects co-operate instead of excluding each other. This would indeed comply with the multi-dimensionality we came across. We need to get the whole story if we want to understand!

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Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.explore.2021.05.001.

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