



Systems Approaches to Occupational Vocal Health: Considerations for Community Faith Leaders

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Abstract

Systems thinking approaches can benefit the occupational vocal health of vocally reliant workers. This paper explores community faith leaders as an example of a highly vocally reliant occupation, who may benefit from systems thinking being used to support their vocal occupational health and safety. A scoping review of the current literature regarding faith leaders' occupational voice use and vocal health is detailed, including recognised occupational hazards. This article then discusses the unique and potential use of systems thinking for facilitating faith leaders' vocal occupational health and safety. Rather than using a solely clinical perspective, the sociotechnical systems approach and the biopsychosocial–spiritual approach are noted as particularly pertinent for this occupational group.

Keywords Occupational voice users · Faith leaders · Religion · Biopsychosocial–spiritual approach · Sociotechnical systems approach · The International Classification of Functioning, Disability and Health

Introduction

Systems thinking considers various cross-disciplinary approaches, theoretical perspectives, and relevant issues for identifying and analysing systems (Cabrera & Cabrera, 2020). Systems thinking rejects the reductionist notion that systemic components must only be considered in isolation (Cabrera & Cabrera, 2020; Hulme

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et al., 2019; McLean et al., 2019). Rather, systems thinking explores (i) the complex, interconnected ways that systems influence our life participation, (ii) holistic systems performance, and (iii) the dynamic relationships between systemic components (i.e. system factors) (Cabrera & Cabrera, 2020; Mazzei et al., 2020; McLean et al., 2019, 2021; Salmon & McLean, 2020).

Various approaches to systems thinking are engaged across health and work domains. Examples include the ‘sociotechnical systems approach’ (Read et al., 2020; Walker et al., 2008), the ‘biopsychosocial model’ (Engel, 1977; Schwartz, 1982), the ‘International Classification of Functioning, Disability, and Health (ICF)’ (World Health Organization, 2001), and the ‘biopsychosocial–spiritual approach’ (Sulmasy, 2002).

Systems Thinking and Occupational Vocal Health

Systems thinking applied to voice (i.e. vocal ergonomics) aims to optimise vocally reliant activities and broader systems participation (Bridger, 1995; Buckley et al., in press; Vilkmán, 2001). Systems thinking applied to voice extends beyond clinical approaches to vocal health, so as to support (i) vocal health and safety, (ii) voice, task, and systems performance, and (iii) voice-related usability and accessibility (Bridger, 1995; Buckley et al., in press; Sala & Rantala, 2019; Vilkmán, 2001, 2004).

Systems thinking allows the dynamic exploration of vocally reliant workers’ vocal health flourishing and safe voice use for work. This is collectively termed ‘vocal OHS’ (i.e. *vocal occupational health and safety*). Taking a systems approach to occupational vocal health allows recognition that potentially unsafe voice use occurs because of broader systemic factors. Examples of unsafe voice use behaviours include loud voice, lengthy voice use without breaks, inadequate recovery, and voice use during experiences of intense emotions (Buckley et al. in press; Vilkmán, 2001, 2004).

Systems thinking also considers occupational vocal health to be multifactorial, with occupational hazards contributing to the likelihood of poor occupational vocal health (Buckley et al. in press; McAleavy et al., 2008; Vilkmán, 2001, 2004). Addressing occupational hazards forms part of supporting vocal health flourishing at work (Buckley et al. in press; Vilkmán, 2001).

Systemically addressing occupational vocal health is advocated for the 25–33% of global labour forces who are vocally reliant to undertake work-related activity and participation (Buckley et al. in press; Palheta Neto et al., 2009; Titze et al., 1997; Vilkmán, 2001, 2004). Reliance on voice for workability increases workers’ risks of poor vocal health (Buckley et al., 2015; Fuentes-López et al., 2019; Morawska & Niebudek-Bogusz, 2017; Munier et al., 2019; Rezende et al., 2020; Titze et al., 1997; Verdolini & Ramig, 2001). In overall terms, poor vocal health also negatively affects vocally reliant workers’ health and well-being. Table 1 outlines examples of these affects.

Systemic considerations of occupational vocal health typically integrate voice into broader occupational health and safety methods (e.g., hazard identification, risk

Table 1 Negative experiences associated with vocally reliant workers' poor vocal health

Associated experience	Literature
Elevated experiences of workload	Rezende et al. (2020), da Rocha et al. (2017)
Diminished psychosocial well-being	Rezende et al. (2020), da Rocha et al. (2017)
Diminished ongoing occupational participation capabilities	da Rocha et al. (2017), Isetti and Meyer, (2014)
Broader general health implication	Vilkman (2004), Williams (2003)
Work-related musculoskeletal disorders (WMSDs)	dos Santos et al. (2019), McAleavy et al. (2008), Rantala et al. (2018)
Mental health disorders	Bermúdez de Alvear et al. (2010), da Rocha et al. (2017), Ferreira de Brito Mota et al. (2019)

Table 2 Examples of occupational hazards common to vocally reliant workers

Occupational Hazards	Literature
Voice use (e.g. lengthy, loud voice use)	Devadas et al. (2017), McAleavy et al. (2008), Vilkman (2004)
Unfavourable postures and muscular tension	Devadas et al. (2017), McAleavy et al. (2008), Rantala et al. (2018)
Inadequate instrumental support	McAleavy et al. (2008), Gaskill et al. (2012)
Unfavourable physical environment (e.g. acoustic environment, air quality)	Rezende et al. (2020), Devadas et al. (2017), McAleavy et al. (2008), Sala and Rantala (2016), Vilkman (2004)
Psychosocial factors	Rezende et al. (2020), Bermúdez de Alvear et al. (2010), Devadas et al. (2017), McAleavy et al. (2008), Vilkman (2004)

management, policy; McAleavy et al., 2008; Vilkman, 2001, 2004). This is done to address workplace hazards (McAleavy et al., 2008; Vilkman, 2001, 2004). Table 2 details common occupational hazards for vocally reliant workers. Despite recognised hazards, detailed considerations of which systems thinking approach would best meet the needs of vocally reliant workers appears to be lacking.

Faith Leaders and Occupational Voice

In this article, *'faith leaders'* collectively refers to spiritual conduits from various officially recognised worship traditions (e.g. Buddhism, Christianity, Hinduism, Islam, Judaism, etc.). Faith leaders are a heterogenous occupation, with their employment highly influenced by contextual factors (e.g., traditions of worship, characteristics and needs of congregation, broader sociocultural factors, physical environments) (WHO, 2001). However, across worship traditions, faith leaders are globally recognised as vocally reliant workers (Middleton & Hinton, 2009; Palheta Neto et al., 2009; Puchalski et al., 2020; Titze et al., 1997). Indeed, The *United Nations Educational, Scientific, and Cultural Organization (UNESCO)* acknowledge

that faith leaders' occupational voice use is culturally significant for community engagement and spiritual practices (Ramani et al., 2021).

Faith leaders often undertake relational communication during spiritual care and worship practices (Palheta Neto et al., 2009). This is facilitated by their dynamic voice use patterns (i.e. varied uses of volume, pitch, tone) (Reed & Sims, 2017). However, echoing other vocally reliant workers, faith leaders experience vocal health hazards resulting from occupational vocal reliance across work contexts (Lopes Lobo et al., 2018; Vilkman, 2001, 2004).

Systemically considering contributory factors for occupational vocal health is recommended to address hazards and facilitate workers' vocal health flourishing (Buckley et al. in press; Vilkman, 2001). A systems approach appears valuable for faith leaders, given: (i) their vocally reliant work, (ii) occupational risks for voice that are experienced by faith leaders and other vocally reliant workers, and (iii) the relational nature of faith leaders vocally reliant activities—particularly during high-risk and traumatic circumstances (e.g. natural disasters, pandemics, civil unrest, terrorism, war).

Aims and Method

This research aimed to (i) explore factors that influence faith leaders' vocal OHS, and (ii) consider why specific systems thinking approaches should be advocated for faith leaders' vocal OHS. Faith leaders were selected as they are a small, but emerging cohort within the occupational vocal health literature. Further, they appear to have specific vocal OHS needs.

This article first presents an exploratory overview of extant literature regarding faith leaders' vocal OHS. Secondly, this work discusses why systems thinking is appropriate when considering faith leaders' occupational vocal health. Reference will be made to the 'biopsychosocial approach' and the 'ICF'. However, use of the 'sociotechnical systems approach' and the 'biopsychosocial–spiritual approach' are particularly advocated to guide faith leaders' vocal OHS.

Method for Scoping Faith Leaders' Vocal OHS

Arksey and O'Malley's (2005) scoping literature review method was utilised in this study, given the likelihood of limited previous research regarding faith leaders' occupational vocal health. The scoping review approach required (i) identifying the research question, (ii) developing inclusion and exclusion criterion, (iii) identifying relevant studies for study selection, (iv) charting the data, and (v) collating, summarising, and reporting the results. A summary of the scoping review stages, specific strategies, and terms are presented in Table 3.

Table 3 Literature scoping review stages and strategy

Stage	Strategy
1. Research question	‘What published literature exists regarding occupational vocal health and faith leaders?’
2. Inclusion and exclusion criteria	(i) Published 2000 onwards, (ii) peer-reviewed or professional journal, iii. English language only, and (iv) only literature related to authorised faith leaders (e.g. clergy/clerics; refer to Stage 3)
3. Identifying relevant studies	(i) Synonyms, (ii) key words, and (iii) database search terms were used to identify relevant literature: Faith Leaders: <i>clergy, minister, pastor, priest, rabbi, chaplain, monk, nun, imam, pastoral carer, spiritual carer</i> ; Occupational Vocal Health: <i>voice use, vocal function, voice / vocal quality, voice signs, voice symptoms, voice problems, voice disorders, voice complaints, dysphonia, voice / vocal (dis)comfort, voice / vocal hygiene, voice / vocal ergonomics, voice / vocal occupational health and safety, occupational voice demands, occupational vocal health hazards / risk factors / vocal loading factors</i> ^a
4. Charting the data	OVID, CINAHL, Medline, Google Scholar, PubMed database abstracts were screened and selected for relevance to topic. Manual searching of article reference lists of selected articles was also completed. Articles deemed relevant were analysed, and the dominant and subordinate themes arising from each article recorded
5. Reporting results	Thematic data charting identified two key themes and multiple subthemes, namely (i) faith leaders’ poor vocal health and (ii) occupational hazards for vocal health (refer to Results section of this paper)

Based on Arksey and O’Malley (2005)

^aOccupational vocal health hazard terms based on Vilkmán (2004)

Scoping Review Findings

Over 18,000 articles were initially identified across various tertiary databases (see Table 3) when charting literature on occupational vocal health and the various nomenclature or synonyms for faith leaders. Publications’ title and abstract content was then screened according to the inclusion/exclusion criteria. Duplicates and non-specifically related articles were also removed. This culling process identified 21 relevant articles ($n=21$) relating specifically to the occupational vocal health of faith leaders. Manual searching of references for these publications revealed no additional sources that met the inclusion criteria. Table 4 details the literature across various faith leadership groups.

Two key themes, with associated subordinate themes, were developed from the scoped occupational vocal health literature (see Table 5). Broader relevant vocal health literature will illuminate discussion of each theme within the following sections.

Table 4 Traditions of faith leadership within scoped literature for ‘voice use’ and ‘vocal health’

Faith leadership	Literature
Christian faith leaders	
Catholic priests and vicars	Boltežr and Šereg Bahar (2014), Hočevár-Boltežar (2009)
Chaplains and spiritual carers	Drummond and Carey (2020), Puchalski et al. (2020)
Evangelical pastors	do Nascimento Martins et al. (2018)
Evangelical Lutheran priests	Hagelberg and Simberg (2015)
Mar Thoma priests (Christian)	Devadas et al. (2016)
Pentecostal pastors, renewal evangelicals	Lopes Lobo et al. (2018)
Seventh-Day Adventist pastors	Palheta Neto et al. (2009)
Hindu faith leaders	
Hindu purohīts, priests	Balasubramanium et al. (2018), Devadas et al. (2019)
Verdic chanters	Ramani et al. (2021)
Islamic faith leaders	
Alimah	Jayakumar & Mohamed Yasin (2021)
Imam	Abdelhamid and Al-Khoufi (2017), Farahat and Mesallam (2016), Subasi et al. (2020)
Quran reciters and priests	Abou-Elsaad et al. (2017)
Religious officials	Büyükcatalay et al. (2020)
Jewish faith leaders	
Reform Jewish cantors	Hapner and Gilman (2012)
Varied faith-based clergy	
<i>Faith-base not reported</i>	Reed and Sims (2017)
	Middleton and Hinton (2009)
Faith leadership genders	
Females	Jayakumar & Mohamed Yasin (2021), Middleton and Hinton (2009)
Males	Abdelhamid and Al-Khoufi (2017), Balasubramanium et al. (2018), Boltežr and Šereg Bahar (2014), Farahat and Mesallam (2016), Hočevár-Boltežar (2009), Lopes Lobo et al. (2018), Subasi et al. (2020)
Diverse	Hagelberg and Simberg (2015), Büyükcatalay et al. (2020)
Unspecified	Abou-Elsaad et al. (2017)

Table 5 Key themes and subordinate themes related to faith leaders and vocal OHS

Key themes	Subordinate themes
1. Faith Leaders’ Adverse Vocal Health	(i) Voice signs, (ii) voice symptoms, (iii) voice problems
2. Occupational Hazards for Vocal Health	(i) Personal hazards, (ii) vocally reliant activity hazards, (iii) environmental hazards, (iv) sociocultural hazards, (v) actions to mitigate hazards

Theme 1: Faith Leaders' Vocal Health

Faith leaders often experience diminished vocal health associated with their work (Büyükcatalay et al., 2020; Devadas et al., 2016, 2019; do Nascimento Martins et al., 2018; Hagelberg & Simberg, 2015; Hapner & Gilman, 2012; Hočevár-Boltezar, 2009; Jayakumar & Mohamed Yasin, 2021; Middleton & Hinton, 2009; Palheta Neto et al., 2009; Ramani et al., 2021; Reed & Sims, 2017; Subasi et al., 2020). Poor vocal health includes:

- Voice signs—noticeable changes in voice performance (Colton et al., 2006);
- Voice symptoms—a voice users' negative personal experiences of vocal health (Russell, 1999; World Health Organization, 2001); and
- Voice problems—health-related difficulties that limit a voice users' activities and overall life participation (Russell, 1999; World Health Organization, 2001).

The following sections detail the published literature reporting on faith leaders' voice signs, symptoms, and problems.

Voice Signs

Vocal ill-health may be witnessed by others through noticeable changes in voice quality and performance (aka voice signs) (Colton et al., 2006). Voice signs are not typically reported within research on faith leaders. However, female pastors' demanding vocal tasks were associated with their diminished voice quality features (Middleton & Hinton, 2009). These voice signs included vocal roughness, breathiness, speaking on residual air, glottal fry, hard glottal attack, and strain or strangled voice (Middleton & Hinton, 2009).

Voice Symptoms

A voice user may have various negative personal experiences associated with their vocal health (aka voice symptoms) (Russell, 1999; World Health Organization, 2001). Voice symptoms are often linked to voice use, and faith leaders across traditions of worship frequently experience various voice symptoms (Devadas et al., 2016; do Nascimento Martins et al., 2018; Hagelberg & Simberg, 2015; Palheta Neto et al., 2009; Ramani et al., 2021; Reed & Sims, 2017; Subasi et al., 2020). Voice symptoms are analogous with impairment, in that symptoms mean diminished vocal health status (Russell, 1999; WHO, 2001). This is distinct from 'voice problems', which are noted later in this article.

Frequent habitual throat clearing is one example of a voice symptom. This has been reported for Catholic priests (Hočevár-Boltezar, 2009), Hindu temple priests (Ramani et al., 2021), Seventh-Day Adventist preachers (Palheta Neto et al., 2009), Mar Thoma priests (Devadas et al., 2016), evangelical Lutheran priests (Hagelberg & Simberg, 2015), and evangelical pastors (do Nascimento Martins et al., 2018). Frequent coughing is also reported for evangelical Lutheran priests (Hagelberg

& Simberg, 2015) and evangelical pastors (do Nascimento Martins et al., 2018). Throat clearing and coughing are recognised as being potentially vocally unsafe behaviours (aka phonotraumatic) that can cause additional voice symptoms for faith leaders (Hočevár-Boltezar, 2009; Jayakumar & Mohamed Yasin, 2021; Middleton & Hinton, 2009). Further, evangelical pastors report that phlegm in the throat often accompanies their voice use at work.

Hoarseness is regularly experienced by Seventh-Day Adventist preachers (Palheta Neto et al., 2009), evangelical Lutheran priests (Hagelberg & Simberg, 2015), and other clergy (Reed & Sims, 2017). Frequent experiences of vocal fatigue are also noted by Hindu temple priests (Ramani et al., 2021), evangelical Lutheran priests (Hagelberg & Simberg, 2015), and evangelical pastors (do Nascimento Martins et al., 2018). Seventh-Day Adventist preachers also experience laryngeal pain and irritation associated with work-related voice use (Palheta Neto et al., 2009).

Voice Problems

Poor vocal health can limit a voice users' activities and overall life participation (Russell, 1999; World Health Organization, 2001). When this occurs, poor vocal health is considered a voice problem (Russell, 1999; World Health Organization, 2001). Voice problems are analogous with disability, given that diminished vocal health creates barriers to activity and broader life participation (Russell, 1999; WHO, 2001).

The published literature also indicates that many faith leaders experience voice problems (Büyükcatalay et al., 2020; Devadas et al., 2016, 2019; do Nascimento Martins et al., 2018; Hagelberg & Simberg, 2015; Hapner & Gilman, 2012; Hočevár-Boltezar, 2009; Jayakumar & Mohamed Yasin, 2021). Prevalence for faith leaders' voice problems across their careers (based on cohort sampling) ranges from 43% to 86% (Devadas et al., 2016, 2019; Hapner & Gilman, 2012; Hočevár-Boltezar, 2009). Within this range, Catholic priests and Anglican vicars have the highest reported career prevalence of voice problems (Hočevár-Boltezar, 2009), with Hindu temple priests the lowest (Devadas et al., 2019). However, caution should be used when directly comparing reporting by faith leaders across these studies, given variability in study designs.

Point prevalence data were collected in two studies. Hagelberg and Simberg (2015) found that 21% of participating evangelical Lutheran priests had a voice problem at the time of their study. Similarly, Devadas and colleagues found that 19% of Hindu temple priests reported experiencing a voice problem during their study span (Devadas et al., 2019).

Further, research has identified that Islamic student alimahs (Jayakumar & Mohamed Yasin, 2021) and imams (Büyükcatalay et al., 2020) are at high risk of developing voice problems related to their career pursuits.

Theme 2: Occupational Hazards for Vocal Health

The published literature recognises various hazards for faith leaders' vocal health. The following sections detail occupational hazards emerging across faith leaders' work systems.

Personal Hazards

Personal factors influence faith leaders' occupational vocal health (Hočevár-Boltezar, 2009; Reed & Sims, 2017). Age, gender, health status, voice awareness, and education influence faith leaders' voices (Büyükcatalay et al., 2020; Hagelberg & Simberg, 2015; Jayakumar & Mohamed Yasin, 2021; Reed & Sims, 2017).

Faith leaders in some geographic areas and faith traditions work beyond typical retirement age (Hočevár-Boltezar, 2009). Older age may negatively contribute to faith leaders' risks of poor vocal health (Reed & Sims, 2017). However, this finding is not consistent across research. For example, Hočevár-Boltezar (2009) found that older priests undertook modified vocally reliant work demands comparative to younger faith leaders, so older priests may not subsequently experience the same occupational risks.

Gender influences faith leaders' vocal health experiences, with female faith leaders more likely to report experiencing voice symptoms and problems (Hagelberg & Simberg, 2015). This mirrors broader research assertions that females experience higher vocal loads associated with differences in laryngeal structures, body functioning, psychosocial factors, life-domain functioning and that females more readily engage in help-seeking (Atarâ-Piraquive & Cantor-Cutiva, 2021; dos Santos et al., 2019; Hunter et al., 2011; Lyberg-Åhlander et al., 2019).

Broader health status also affects faith leaders' vocal health during service and pre-service education (Hagelberg & Simberg, 2015; Hapner & Gilman, 2012; Hočevár-Boltezar, 2009; Jayakumar & Mohamed Yasin, 2021). Broader health concerns that influence faith leaders' voices include respiratory illnesses, asthma, allergies, post-nasal drip, and gastroesophageal reflux (Boltežr & Šereg Bahar, 2014; Devadas et al., 2016; Hagelberg & Simberg, 2015; Hapner & Gilman, 2012; Hočevár-Boltezar, 2009; Jayakumar & Mohamed Yasin, 2021; Middleton & Hinton, 2009). These health issues can affect vocal fold functioning and contribute to faith leaders' experiences of voice symptoms (e.g. vocal fatigue and throat clearing) (Hapner & Gilman, 2012; Hočevár-Boltezar, 2009).

Faith leaders' vocal awareness also influences their occupational vocal health. Faith leaders' vocal awareness includes:

- Recognising vocal health experiences (Hagelberg & Simberg, 2015),
- Health-based help-seeking for poor vocal health (Hagelberg & Simberg, 2015; Hapner & Gilman, 2012; Jayakumar & Mohamed Yasin, 2021),
- Safe voice use techniques (Hočevár-Boltezar, 2009; Jayakumar & Mohamed Yasin, 2021; Middleton & Hinton, 2009), and

- Supportive health behaviours for vocal health (e.g. hydration, vocal rest—time away from demanding voice use, avoiding smoke) (Abdelhamid & Al-Khoufi, 2017; Balasubramaniam et al., 2018; Boltežr & Šereg Bahar, 2014; do Nascimento Martins et al., 2018; Jayakumar & Mohamed Yasin, 2021).

While some faith leaders report having high levels of voice awareness (Hagelberg & Simberg, 2015), limitations in voice awareness experienced by a majority of faith leaders appear to negatively affect their vocal health (Abdelhamid & Al-Khoufi, 2017; Boltežr & Šereg Bahar, 2014; Hagelberg & Simberg, 2015; Hočevár-Boltezar, 2009; Jayakumar & Mohamed Yasin, 2021; Middleton & Hinton, 2009).

Faith leaders' vocal awareness may also be influenced by their prior education. Education on safe voice practices is advocated within the literature for occupational voice users (Latham et al., 2017; Rodero et al., 2018), including faith leaders (Hagelberg & Simberg, 2015; Middleton & Hinton, 2009). This is considered particularly relevant during pre-service and early career spans, when workers are still developing health coping mechanisms (Latham et al., 2017; Rodero et al., 2018). However, when in service, vocally reliant workers undertake potentially unsafe voice use patterns responsive to broader work-related hazards (e.g. noise, task demands, psychosocial factors) (Lopes Lobo et al., 2018; Rantala et al., 2015; Vilkman, 2001). As such, voice education opportunities should form *part* of an integrated systemic approach to vocal OHS (Vilkman, 2001).

Faith leadership education and training are highly variable, including learning opportunities for voice (Büyükcatalay et al., 2020; Hapner & Gilman, 2012). For example, some Indian Islamic student alimahs and US student reformist Jewish cantors receive vocal training in (safe) voice technique to effectively meet task requirements (e.g. teaching, preaching, public speaking) (Hapner & Gilman, 2012; Jayakumar & Mohamed Yasin, 2021). However, voice use education is reportedly missing for Turkish Islamic religious officials and Indian Hindu purohit (Balasubramaniam et al., 2018; Büyükcatalay et al., 2020).¹ Learning opportunities regarding supportive vocal health behaviours appear limited within career education across faith leadership traditions (Balasubramaniam et al., 2018; Büyükcatalay et al., 2020; Hapner & Gilman, 2012; Jayakumar & Mohamed Yasin, 2021). Vocal OHS is also not reportedly considered within faith leaders' education. Further, limitations in voice education are linked to faith leaders' poor vocal health across their careers (Hočevár-Boltezar, 2009; Reed & Sims, 2017).

Vocally Reliant Activity Hazards

Faith leaders undertake diverse vocally reliant tasks, which require varied voice use behaviours. Detailed analysis of the unique vocal task demands undertaken by faith leaders are still emerging within existing literature, comparative to other vocally reliant occupational groups. Faith leaders' vocal task demands also vary depending on

¹ Purohit/Purohita in the Indian religious context means priest or chaplain. See Balasubramaniam et al. (2018) for more details.

Table 6 Examples of faith leaders' vocal task demands

Vocal task demand	Literature
<i>Intimate communication</i>	
Spiritual care tasks including supporting people in spiritual distress (e.g. people facing serious illness and death), intimate counselling, religious guidance	Abdelhamid and Al-Khoufi (2017), do Nascimento Martins et al. (2018), Middleton and Hinton (2009), Lopes Lobo et al. (2018), Palheta Neto et al. (2009), Puchalski et al. (2020), Titze et al. (1997)
<i>Loud and lengthy voice use</i>	
Singing, chanting, recitation, call to pray	Devadas et al. (2019), Farahat and Mesallam (2016), Hagelberg and Simberg (2015), Hočevár-Boltezar (2009), Lopes Lobo et al. (2018), Palheta Neto et al. (2009), Ramani et al. (2021); Subasi et al. (2020), Titze et al. (1997)
Lengthy sermons and rituals	Balasubramaniam et al. (2018), Reed and Sims (2017)
Heavy vocal demands throughout the working day	Hagelberg and Simberg (2015), Hočevár-Boltezar (2009), Subasi et al. (2020)
Increased vocal task demands during specific times of religious significance	Abdelhamid and Al-Khoufi (2017)
<i>Ceremony officiating</i>	
Officiate ceremonies, such as weddings, baptisms, confirmations, and funerals	Balasubramaniam et al. (2018), do Nascimento Martins et al. (2018), Middleton and Hinton (2009), Subasi et al. (2020)
<i>Worship participation</i>	
Worship participation, worship leading, delivery of group religious education (e.g. sermons, mass, derashsh, khutbah, adhan)	Abdelhamid and Al-Khoufi (2017), Balasubramaniam et al. (2018), Devadas et al. (2019), Farahat and Mesallam (2016), Hagelberg and Simberg (2015), Hočevár-Boltezar (2009), Jayakumar & Mohamed Yasin (2021), Middleton and Hinton (2009), Palheta Neto et al. (2009), Ramani et al. (2021), Subasi et al. (2020), Titze et al. (1997)
<i>Other instruction and education</i>	
Broader forms of instruction and education, including guiding junior clergy	Abdelhamid and Al-Khoufi (2017), do Nascimento Martins et al. (2018), Farahat and Mesallam (2016), Hočevár-Boltezar (2009), Jayakumar & Mohamed Yasin (2021), Lopes Lobo et al. (2018), Middleton and Hinton (2009), Palheta Neto et al. (2009)
<i>Social events</i>	
Participation in social events and projects	do Nascimento Martins et al. (2018)
<i>Administration</i>	
Organisational administration, including telecommunication	do Nascimento Martins et al. (2018), Middleton and Hinton (2009), Palheta Neto et al. (2009)

broader systemic factors (e.g., traditions of worship, faith leadership contexts, roles, geographic locations) (WHO, 2001). Table 6 details the examples of the diverse tasks undertaken during faith leadership activities.

Some vocally reliant activities undertaken by faith leaders require intimate talking. Voice use during these tasks incorporates intimate spoken communication (Middleton & Hinton, 2009; Titze et al., 1997), including the potentially phonotraumatic behaviour of lengthy whispering used to ensure confidentiality (Carey et al., 2015; Hočevár-Boltezar, 2009).

Faith leaders also undertake tasks that necessitate loud, lengthy voice use (Devadas et al., 2019; Hagelberg & Simberg, 2015; Hočevár-Boltezar, 2009; Palheta Neto et al., 2009; Ramani et al., 2021; Subasi et al., 2020; Titze et al., 1997). Extended use of loud voice and singing are recognised as potentially unsafe for voice (Gaskill et al., 2012; Thibeault et al., 2004), especially when undertaken without instrumental support such as amplification (Gaskill et al., 2012).

Ongoing voice use without adequate vocal rest is also associated with faith leaders' diminished vocal health (Hapner & Gilman, 2012; Titze et al., 1997). For example, lengthy sermons are a predictive factor for faith leaders' experiencing hoarseness (Reed & Sims, 2017). Workload schedules that contain high levels of vocally reliant work activities are recognised to limit opportunities for faith leaders' vocal rest (Middleton & Hinton, 2009). So too is limited access to replacement personnel for faith leadership (Boltežr & Šereg Bahar, 2014). Periods of vocal rest support repair of vocal fold tissue following demanding voice use (Rantala et al., 2018).

Large distances between communication partners also contribute to faith leaders' vocally reliant activity demands and poor vocal health experiences (Hagelberg & Simberg, 2015; Middleton & Hinton, 2009). Extensive distances increase vocal demands for the voice user (McAleavy et al., 2008; Sala & Rantala, 2019; Vilkmán, 2004), which accentuates the likelihood of using unsafe vocal behaviours to be heard by others (Vilkmán, 2001, 2004). Large distances between communication partners can occur during various tasks undertaken by faith leaders, including speaking to large crowds and speaking outside (Hagelberg & Simberg, 2015).

The influence of psycho-emotional factors on voice is recognised for faith leaders (Titze et al., 1997), alongside broader vocally reliant workers (O'Neill & McMenamin, 2014; Penteadó et al., 2015a, 2015b; Titze et al., 1997; Vertanen-Greis et al., 2020). For broader vocally reliant workers, psycho-emotional links are reported between unsafe voice use behaviours, voice use during heightened emotions, muscular tension, voice symptoms, and burnout (Ferreira de Brito Mota et al., 2019; O'Neill & McMenamin, 2014; Penteadó et al., 2015a). The influence of psycho-emotional factors and faith leaders' vocal health should be directly explored, particularly given the inclusion of spiritual care for others and personal distress support within faith leaders' vocally reliant tasks (Middleton & Hinton, 2009; Palheta Neto et al., 2009; Puchalski et al., 2020; Titze et al., 1997).

Physical Environmental Hazards

Faith leaders undertake their work in diverse physical environments, including temples (Devadas et al., 2019), mosques (Subasi et al., 2020), churches or chapels (Hočevár-Boltezar, 2009), aged care facilities (Drummond & Carey, 2020), outdoor locations (Hagelberg & Simberg, 2015), and broader community-led spaces

(Abdelhamid & Al-Khoufi, 2017; Balasubramaniam et al., 2018). Further, the evolving nature of technology and world events (e.g. COVID-19) means that telepresence is increasingly part of how faith leaders undertake vocally reliant work (Drummond & Carey, 2020).

Physical environments contribute to faith leaders' vocal health (Hagelberg & Simberg, 2015; Middleton & Hinton, 2009). This includes their impacts on vocal task demands (Hagelberg & Simberg, 2015; Lopes Lobo et al., 2018; Middleton & Hinton, 2009) and faith leaders' responsive voice use behaviours (Hagelberg & Simberg, 2015; Middleton & Hinton, 2009).

For example, the presence of unfavourable acoustic environments affects faith leaders' vocal demands (Hagelberg & Simberg, 2015; Lopes Lobo et al., 2018; Middleton & Hinton, 2009) and vocal health (Hagelberg & Simberg, 2015; Middleton & Hinton, 2009). Loud environments increase vocal demands, reduce listeners' ease of hearing, and elevate cognitive loads across communication partners (Rezende et al., 2020; Sala & Rantala, 2016). Heavy acoustic reverberation, which is present in many churches (Soeta et al., 2012), also increases vocal demands by interfering with speech intelligibility (Bridger, 1995).

Air quality and atmospheric humidity also influence faith leaders' voices (Hagelberg & Simberg, 2015; Middleton & Hinton, 2009). In particular, dry air is linked to faith leaders' poor vocal health (Hagelberg & Simberg, 2015). Dry air and airborne pollutants can trigger the upper airway inflammatory response by affecting vocal fold mucous membrane (Rantala et al., 2012; Sandage et al., 2017). This can also generate chronic cough, which subsequently creates additional phonotrauma (Rantala et al., 2012; Sandage et al., 2017).

Sociocultural Hazards

Sociocultural factors are highly variable for faith leaders and appear to influence their voice use (Reed & Sims, 2017). This includes faith leaders' voice use patterns (e.g. styles and habits with using varied volume, pitch, tone) (Reed & Sims, 2017). Sociocultural factors also influence expectations by others about faith leaders' voice performance during job tasks (Reed & Sims, 2017), for example how Quran reciters use voice for undertaking unaccompanied singing tasks (e.g. call to worship) (Abou-Elsaad et al., 2017). However, the influence of broader sociocultural factors on faith leaders' vocal health is yet to be extensively explored within extant literature. Sociocultural contextual factors are asserted to affect workers' vocal and general health more broadly (Bermúdez de Alvear et al., 2010; Buckley et al., 2015; Rantala et al., 2012; WHO, 2001). For vocally reliant workers, influential sociocultural factors include (i) organizational expectations of workers, (ii) workplace culture, (iii) job security, (iv) social supports, (v) nature of industry, and (vi) broader community expectations of vocally reliant workers (Bermúdez de Alvear et al., 2010; Buckley et al., 2015; Rantala et al., 2012). Country characteristics and working condition trends also affect workers' experiences of poor occupational health (Eurofound, 2019).

Actions to Mitigate Hazards

Faith leaders' amplification use is recognised to mitigate some effects of noisy environments and large distances between communication partners (Hagelberg & Simberg, 2015; Middleton & Hinton, 2009; Vilkman, 2001). Faith leaders are reported to often use amplification across locations of worship (Hagelberg & Simberg, 2015; Vilkman, 2001). For example, Hagelberg and Simberg found that 50% of faith leaders 'always' used amplification when preaching and 42% 'often' used amplification when preaching (Hagelberg & Simberg, 2015). However, amplification use may not be appropriate, preferred, or accessible across all faith leaders' work locations or tasks (e.g. sanctuaries, cemeteries, confessionals, healthcare/hospital visits) (Middleton & Hinton, 2009). For example, Hindu purohits reportedly do not use amplification or public address systems (Balasubramaniam et al., 2018).

Imams often overcome the repeated demands of noisy environments and far distances between communication partners through the use of pre-recorded adhan (aka *call to prayer*) (Subasi et al., 2020). These pre-recordings ensure consistent vocal delivery and avoid imams needing to repeatedly engage in this highly vocally demanding task throughout their working week (Subasi et al., 2020). However, access to recorded adhan and adequate amplification and/or transmission is not always possible (Subasi et al., 2020).

Faith leaders also modify who undertakes vocally reliant tasks. For example, sharing the overall activity demands between multiple faith leaders avoids vocal overload that may be experienced if the activity tasks were undertaken solo (Devadas et al., 2016; Hočevár-Boltezar, 2009). As previously noted, this strategy will support the voice use of older priests, as junior clergy can assist with undertaking vocally reliant worship tasks (Devadas et al., 2016; Hočevár-Boltezar, 2009).

Systems Approaches to Vocal OHS

The second aim of this paper was to consider the use of a systems approach for addressing vocal OHS for vocally reliant workers, with particular focus on faith leaders.

Systems thinking explores experienced and anticipated functioning at elemental and whole system levels. This is done to support systemic optimisation (Mazzei et al., 2020; McLean et al., 2019, 2021; Salmon & McLean, 2020). Further, the influence of context is recognised across systems participation and analysis (Cabrera & Cabrera, 2020), including how context can affect perspectives and meaning-making (Hulme et al., 2019; McLean et al., 2019). Approaches to systems thinking require differing orientations, frameworks, analytical, and optimisation methods. Four approaches to systems thinking are detailed in the following sections. Each approach explores how the application of systems thinking can be considered for vocal health.

The Sociotechnical Systems Approach

The sociotechnical systems approach aims to concurrently enhance technical (i.e. skills, mechanical, technological) and social (i.e. people, organisational, societal) elements within work systems (Read et al., 2020; Walker et al., 2008). This is done through action inquiry (Cabrera & Cabrera, 2020) and participatory design (Read et al., 2020).

The sociotechnical systems approach assumes that humans are positive assets (Read et al., 2020) and that technology functions as tools to support humans in their activities (Read et al., 2020). This approach also adopts the stance that quality of life is integral to work experiences (Read et al., 2020) and that human differences are to be respected within system design (Read et al., 2020). Further, sociotechnical systems have the responsibility to consider any (re)design impacts on stakeholders (Read et al., 2020). The sociotechnical systems approach allows collaborative intervention and improvement by supporting the integration of local experts' key insights into effective design, implementation, and evaluation of systems (Hay et al., 2020).

A sociotechnical systems approach applied to vocal OHS would hypothetically facilitate flexible, inclusive, and cross-system consideration of faith leaders' voice use and vocal health. It would also support collaborative engagement of faith leaders' local knowledge in combination with other expertise (e.g. OHS, broader health expertise). This would allow contextually anchored identification of systemic factors that influence faith leaders' voices (e.g. vocal hazards, facilitators). Further, this approach allows vocal OHS initiatives to integrate voice-related systems design from technical and social domains.

The Biopsychosocial Model

The biopsychosocial model (Engel, 1977; Schwartz, 1982) advocates that disease and ill-health should not be considered in isolation (Schwartz, 1982). Rather, this approach suggests that healthcare provision should explore how (ill)health emerges from interactions between an individual's biological, psychological, and social factors (Schwartz, 1982). In this way, the biopsychosocial model aligns itself to systems theory (Engel, 1977; Schwartz, 1982).

The biopsychosocial model has been applied to consider poor vocal health of vocally reliant workers (Kooijman et al., 2007; Meulenbroek et al., 2012). However, the biopsychosocial model applied to vocal OHS merely acknowledges the interactive nature of biological, psychological, and social domains. It does not facilitate contextually anchored hazard appraisal or the capacity to support vocal health flourishing at work.

Table 7 WHO international classification of functioning disability and health: religion and spirituality

Intervention	Description
1. Religion and Spirituality (ICF Section D: Activities and participation) [Ch. 9 Community, social and civic life] [Subsection d930 Religion and Spirituality]	Engaging in religious or spiritual activities, organizations and practices for self-fulfilment, finding meaning, religious or spiritual value and establishing connection with a divine power, such as is involved in attending a church, temple, mosque or synagogue, praying or chanting for a religious purpose, and spiritual contemplation
2. Products and technology—Religion and Spirituality (ICF Section E: Environmental Factors) [Ch.1. Products and technology] [Subsection e145 Products and technology for the practice of religion and spirituality]	Products and technology, unique or mass-produced that are given or take on a symbolic meaning in the context of the practice of religion or spirituality, including those adapted or specifically designed. Inclusion: General and assistive products and technology for the practice of religion and spirituality
3. Social norms, practices, and ideology (ICF Section E: Environmental Factors) [Ch. 4 Attitudes] [Subsection e465 Social norms, practice and ideologies]	Customs, practices, rules, and abstract systems of values and normative beliefs (e.g. ideologies, normative world views, and moral philosophies) that arise within social context and that affect or create societal and individual practices and behaviours, such as social norms of moral and religious behaviour or etiquette; religious doctrine and resulting norms and practices; norms governing rituals or social gatherings
4. Association and organisational services [ICF Section E: Environmental factors] [Ch. 5 Services, systems and policies] [Subsection e555 Associations, services, systems and policies]	Associations and organisational services, systems and policies relating to groups of people who have joined together in the pursuit of common, non-commercial interests, often with an associated membership structure—such as associations and organisations providing recreation and leisure, sporting, cultural, religious and mutual aid services

Summary Table: WHO-ICF (2001) Religious and Spiritual Codings (refer Mathisen & Threats, 2018, pp. 42–43)

The ICF

The International Classification of Functioning, Disability and Health (ICF) (World Health Organization, 2001) provides a valuable inventory framework for considering voice use, vocal health, work contexts, religion and spirituality. The ICF extends on the assumptions of the biopsychosocial model—that biological, psychological, and social factors are interrelated. The ICF also integrates key assumptions within the sociotechnical systems approach (e.g. context affects health, humans as assets, aims of human flourishing), although the ICF does not explicitly necessitate worker collaboration to transform systems. Nevertheless, the ICF does acknowledge that health (i.e. not just disorders) is both personally experienced and contextually anchored (World Health Organization, 2001). It also provides a framework for considering the complex and influential interactions between both personal factors (e.g. skills, roles,

impairment) and broader systemic factors (e.g. activities, participation in health-related and broader life domains) (Hopf, 2018; Mulcair et al., 2018; Threats & Worrall, 2004; World Health Organization, 2001).

The ICF is useful for identifying the effects of contextual factors on a person's activities and domains of life participation, such as work and education (WHO, 2001). Religious and spiritual practices are clearly detailed within the ICF (Cerniauskaite et al., 2011; Mathisen & Threats, 2018) (see Table 7). The ICF also explicitly describes communication considerations, including voice (Hopf, 2018; Oates, 2011; Threats & Worrall, 2004; World Health Organization, 2001). Praying, chanting, and singing for religious purposes and spiritual contemplation are examples of vocal behaviours undertaken by faith leaders that are also included in the ICF (WHO, 2001; see Table 7; Mathisen & Threats, 2018, pp. 42–43; Mathisen et al., 2015, pp. 2314–2315).

The ICF catalysed a paradigmatic shift by considering vocal health as more than voice disorder impairment (Oates, 2011). Vocal health care now considered frequency and severity of vocal impairment, activity and participation restrictions, and psychosocial challenges associated with diminished vocal health (Oates, 2011). Subsequent vocal health care also considered vocal well-being (i.e. flourishing) (Sala & Rantala, 2019).

The ICF also provides a useful framework for considering faith leader's vocal OHS due to its recognition of systemic participation, factor interaction, explicit inclusion of religion and spiritual practices, and the influence of broader factors on an individual's health experience. However, the ICF misses a key attribute that is core to the voice use and vocal health care needs of faith leaders—the relational role of spirituality (i.e. broader than just religion).

The Biopsychosocial–Spiritual Approach

The most recent systems framework considered within this paper to explore faith leaders' vocal OHS is the biopsychosocial–spiritual approach (Sulmasy, 2002)—which was developed at the commencement of the twenty-first century. This approach extends the assumptions of the previous century's biopsychosocial approach (Russell et al., 2020), most notably by explicitly and relationally recognising spirituality and spiritual care as part of holistic health. Spirituality has been defined as:

...the aspect of humanity that refers to the way individuals seek and express meaning and purpose and the way they experience their connectedness to the moment, to self, to others, to nature, and to the significant or sacred (Puchalski et al., 2009, p. 887).

Recognition of spirituality and spiritual care was formally categorised as part of the 2002 WHO-ICD-10 intervention codings (WHO, 2002; Carey & Cohen, 2015) and subsequently revised for the 2017 WHO-ICD-10 (WHO, 2017). The WHO-SPICS ('Spiritual Intervention Codings') comprise five types of intervention: (i)

spiritual assessment, (ii) spiritual guidance, counselling, and education, (iii) spiritual support, (iv) spiritual ritual and (v) spiritual care—other allied health intervention. Collectively, these intervention categories encapsulate the diversity of faith leaders' vocally reliant activity role responsibilities, undertaken to support the spiritual well-being of general community members and for people receiving health care.

Spirituality is a core component to the flourishing of health and well-being, as it provides for individual's relational connections, meaning, and purpose (Bruce et al., 2011; Puchalski et al., 2009; Sulmasy, 2002). Spiritual resources (e.g. literature, technology, pastoral encounters, personal rituals) assist in providing meaning-making narratives regarding lived experiences (Rumbold, 2018). Spirituality can be expressed through religion, nature, music, the arts, community, or philosophical beliefs (Sulmasy, 2002).

Spirituality forms part of holistic person-centred health care (Mathisen & Threats, 2018; Rumbold, 2018; Stuckey & Brown, 2018). Spirituality is also considered to be a dimension of occupational ergonomics (Stuckey & Brown, 2018). This is because within both health care and occupational settings, spirituality influences peoples well-being, quality of life, belonging, and satisfaction (Stuckey & Brown, 2018).

The biopsychosocial–spiritual approach as a system of assessment and intervention that is based on an explicitly relational model (Sulmasy, 2002). It recognises that biological, psychological, social, and spiritual dimensions of health are interconnected components of a person's holistic health (Sulmasy, 2002). This approach also acknowledges that disruption to a person's health affects the integrity of this relationality (Sulmasy, 2002), which has been conceptualised as a disrupted homeostasis and biopsychosocial–spiritual imbalance (Meseguer-de-Pedro et al., 2019). This includes affected relationships between someone's:

- Body functioning (i.e. physical body, mind, spirit),
- Intra-personal relationships, and
- Broader life (e.g. employment, environment, society, country, transcendence).

Use of the biopsychosocial–spiritual approach as a form of assessment and intervention emulates the relational nature of the model itself (Sulmasy, 2002). Russell and colleagues highlight that using a biopsychosocial–spiritual approach helps to facilitate collaborative meaning-making and subsequently shared decision making with patients (Russell et al., 2020). For example, the biopsychosocial–spiritual approach has been explored in gynaecological cancer (Chen et al., 2021), mental health (Carey & Del Medico, 2013; Chen et al., 2021), care for elders and children (Drummond & Carey, 2020; Russell et al., 2020), workplace bullying (Meseguer-de-Pedro et al., 2019), and speech pathology practice (Mathisen et al., 2015). However, spiritual care needs are not yet specifically integrated into voice care (Mathisen & Threats, 2018), including vocal OHS.

There is an emerging advocacy for addressing spiritual care needs as part of healthcare provision (Mathisen & Threats, 2018; Rumbold, 2018). This approach supports person-centred holistic care across life domains, including within workplace settings (e.g. as part of OHS) (Stuckey & Brown, 2018). Faith leaders are an occupational group who actively engage in their own spiritual practices and

support the spiritual care of others. As such, utilising the biopsychosocial–spiritual approach is relevant for facilitating faith leaders’ vocal and broader OHS.

Conclusions, Recommendations and Limitations

Faith leaders are vocally reliant workers who experience various occupational hazards affecting their vocal health. Extant literature indicates that across traditions, faith leaders experience voice signs, voice symptoms, and voice problems. Faith leaders’ diminished vocal health is also connected with personal hazards, vocal activity hazards, physical environmental hazards, and sociocultural hazards. It was beyond this current article’s scope to conduct detailed comparisons between denominations and faith leadership traditions. However, further consideration of context-based influences would be highly informative for faith leaders’ vocal OHS. Similarly, a specific systems approach was not deductively applied to guide theme development regarding extant literature on faith leaders’ vocal OHS. This could be explored in future research, such as specifically mapping vocal hazards according to the ICF criteria. Based on vocal reliance and reported poor vocal health experiences, consideration of faith leaders’ vocal OHS is timely.

It would also be advantageous for future research to consider various interventions and solutions for faith leaders’ vocal health. Evaluating applicable clinical interventions for faith leaders also exceeded the scope of this review. However, beyond clinical interventions (which focus on the individual), this paper has argued that systems thinking is fundamental to guiding the optimisation of faith leaders’ vocal health. The original biopsychosocial approach is no longer adequate for this purpose. The sociotechnical systems approach and the biopsychosocial-spiritual approach are particularly recommended for use with this occupational group. This recommendation is based on faith leaders’ (i) vocally reliant work, (ii) adverse vocal health experiences, (iii) occupational vocal health hazards, and (iv) engagement in various spiritual praxis.

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Declarations

Conflict of interest The authors declare no conflict of interest.

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