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The thesis I am submitting is entirely my own work except where otherwise indicated.

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PUBLISHED WORK

This thesis is presented as three papers. All papers will be submitted for publication, with relevant submission guidelines entered as appendices. At the point of thesis preparation:

Systematic review paper is published in the *Journal of Voice* (see Appendix A). The *Journal of Voice* is considered one of the most prestigious academic journals in voice medicine and voice science research. The journal has an established record of publishing highly cited reviews on topics relevant to vocal health and voice care.

Service improvement project paper is being prepared for submission to the *International Journal of Forensic Mental Health* (see Appendix B). The *International Journal of Forensic Mental Health* publishes research relevant to academics and clinicians working in forensic settings, with a focus on research which concerns practical developments in the care of forensic mental health patients.

Theory driven research project paper is being prepared for submission to the *British Journal of Health Psychology* (see Appendix C). The *British Journal of Health Psychology* seeks to publish research which advances understanding of theoretical issues in health psychology, prioritising applicability to clinical and health psychology practice. The journal has a history of publishing similar work conducted in populations with facial palsy.

ABSTRACTS

Systematic Review of the Literature

Clinical psychology and voice disorders: A meta-analytic review of studies assessing psychological characteristics across individuals with and without voice disorders.

Clinical voice disorders are heterogenous conditions capturing problems with vocal production and control. Psychological conceptualisations of voice disorders posit that mood, anxiety, and personality characteristics contribute to the development and maintenance of voice symptoms. This review brings together research comparing these psychological characteristics across groups with and without voice disorders, with the aim of profiling group differences. A systematic search of PubMed, CINAHL, Ovid (PsycInfo, MEDLINE, Embase) and Web of Science databases was conducted, with studies required to assess psychological characteristics between samples with and without voice disorders. Relative study quality and risk of bias was formally evaluated, synthesising results via meta-analysis and narrative synthesis. Forty-three studies (N=5158) were reviewed. Marked psychological differences were observed between clinical and case groups, including significantly higher self-reported features of depression (*d*=0.51), state anxiety (*d*=0.56), trait anxiety (*d*=0.49), and health anxiety (*d*=0.57) in voice disorder groups. However, less consistent patterns of difference were observed between voice disorder types, including minimal quantitative differences between functional and organic diagnoses. Findings underline the psychological features associated with voice disorders, indicating that affected individuals present with considerable psychological needs which may benefit from clinical psychology input.

Key words*: dysphonia; meta-analysis; clinical psychology; formulation; psychosocial*

Service Improvement Project

Forensic mental health staff understanding and experience of personality disorder: A service improvement project.

There is increasing evidence for the prevalence of personality-related difficulties within the forensic mental health service user population. Services therefore need to feel able to provide meaningful and supportive care to those presenting with personality difficulties and personality disorder diagnoses. Current guidelines suggest that categorical approaches to personality, which are increasingly outdated in inferring fundamental differences between those with and without personality diagnoses, continue to dominate forensic mental health service practice, with concerns about implications for service user care and wellbeing. This service improvement project follows the Plan-Do-Study-Act (PDSA) cycle to provide recommendations for service improvement, using a questionnaire and a focus group to explore staff understanding and experience of caring for people with personality disorder diagnoses within the service. Findings identified that respondents feel that those with a personality disorder diagnosis might experience adverse service outcomes, potentially linked to lack of staff understanding or limited training. Recommendations for service improvement focused on theoretical familiarity, access to training, trauma-informed initiatives, psychological workforce representation, outcome data review, protocol updates, and reflective practice opportunities. Recommendations were shared with the service to inform future PDSA cycles and plans for service improvement.

Key words: *personality disorder; forensic; service improvement; QI; survey*

Theory Driven Research Project

Psychosocial distress and interpersonal interaction experience in facial palsy: Associations with facial emotional mimicry.

The impact of facial palsy on mood and interpersonal functioning is increasingly recognised. This research investigated differences in psychosocial distress and interpersonal interaction experience between matched groups with (n=91) and without (n=86) facial palsy, exploring associations with spontaneous facial emotional mimicry as indexed using a mimicry task. Self-report measures were used to assess psychosocial distress and interpersonal interaction experience, with facial emotional mimicry assessed via video observation task in a participant subsample (n=61). Group differences in psychosocial distress and interpersonal interaction experience were observed, with facial palsy participants reporting more pronounced self-reported symptoms of depression, anxiety, and appearance-related dissatisfaction alongside less interpersonal pleasure and excitement. No group differences in facial emotional mimicry were observed, however, with limited associations between mimicry and psychosocial distress and interpersonal interaction experience. Findings are discussed in the context of the social regulator framework and its relevance to people with facial palsy.

Key words: *facial palsy; psychosocial; mimicry; relationships; emotions*

PAPER ONE: SYSTEMATIC REVIEW OF THE LITERATURE

CLINICAL PSYCHOLOGY AND VOICE DISORDERS: A META-ANALYTIC REVIEW OF STUDIES ASSESSING PSYCHOLOGICAL CHARACTERISTICS ACROSS INDIVIDUALS WITH AND WITHOUT VOICE DISORDERS

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Abstract

Clinical voice disorders are heterogenous conditions capturing problems with vocal production and control. Psychological conceptualisations of voice disorders posit that mood, anxiety, and personality characteristics contribute to the development and maintenance of voice symptoms. This review brings together research comparing these psychological characteristics across groups with and without voice disorders, with the aim of profiling group differences. A systematic search of PubMed, CINAHL, Ovid (PsycInfo, MEDLINE, Embase) and Web of Science databases was conducted, with studies required to assess psychological characteristics between samples with and without voice disorders. Relative study quality and risk of bias was formally evaluated, synthesising results via meta-analysis and narrative synthesis. Forty-three studies (N=5158) were reviewed. Marked psychological differences were observed between clinical and case groups, including significantly higher self-reported features of depression (d=0.51), state anxiety (d=0.56), trait anxiety (d=0.49), and health anxiety (d=0.57) in voice disorder groups. However, less consistent patterns of difference were observed between voice disorder types, including minimal quantitative differences between functional and organic diagnoses. Findings underline the psychological features associated with voice disorders, indicating that affected individuals present with considerable psychological needs which may benefit from clinical psychology input.

Key words: *dysphonia; meta-analysis; clinical psychology; formulation; psychosocial*

Introduction

Voice disorders are conditions affecting production and quality of voice, featuring symptoms like hoarseness, asthenia, and dysphonia (Payten et al., 2022). Classification systems (Baker et al., 2007; Payten et al., 2022; Verdolini et al., 2006) propose differences between organic (difficulties with vocal production due to changes in vocal anatomy) and functional (difficulties with vocal production in the absence of organic pathology) voice disorders, with the latter purported to have a more prominent psychological aetiology underscored by interactions between psychological, physical, and vocal distress (Baker, 2016; Butcher et al., 2007). While everyday difficulties with vocal production are fairly common, estimates suggest 1.7% of the population experience clinical voice symptoms requiring intervention (Benninger et al., 2017).

Comorbidity estimates indicate 47% of individuals with voice disorders present with significant mental health difficulties (Jordan et al., 2020), highlighting the psychological needs of this patient group (Andrea et al., 2017; Gray et al., 2021). Existing psychological conceptualisations identify cognitive-behavioural (Carding et al., 2013; Deary et al., 2018; Deary & Miller, 2011; Miller et al., 2014), personality (Roy & Bless, 1998), and psychodynamic (Butcher, 1995) processes, with consensus statements underlining the importance of psychological factors within voice disorder development, maintenance, and treatment (Baker, 2008; Baker et al., 2021; Flock et al., 2023; Scott et al., 1997).

The psychological conceptualisations cited above propose a constellation of precipitating (immediate life stressors; physical illness/injury/viruses) and predisposing (personality; behavioural-inhibition and behavioural-activation systems (BIS/BAS); trauma and adversity) factors involved in the initiation of voice symptoms. Like with medically-unexplained symptoms (Deary et al., 2007), cognitive-behavioural perspectives propose that voice

problems are maintained by a cycle of threat-based interpretations (e.g., rumination; attentional bias; catastrophising) and safety-seeking behaviours (e.g., avoidance; compensatory behaviours; checking), perpetuating voice-related distress. Identifying and formulating the contribution of these psychological factors to vocal pathology is often a focus of voice treatment programmes (Daniilidou et al., 2007; Kollbrunner & Seifert, 2017; Miller et al., 2014), with recognition that further work is needed to understand interplay and impact with regards to organic and functional voice disorders.

This systematic and meta-analytic review underlines the need for more psychologically informed characterisations of voice disorders, highlighting scope for clinical psychology input within voice care services. It brings together research on psychological characteristics in voice disorders and examines evidence of psychological differences between groups with and without voice disorders, comparing those with functional and organic diagnoses to controls. No work to-date has systematically synthesised existing studies in this way, quantitatively characterising psychological features involved in voice disorders with a view to providing a conceptual psychological framework that integrates cognitive-behavioural and personality conceptualisations.

Objectives

- Examine differences in psychological characteristics across groups with and without voice disorders, critically evaluating the quality of existing studies.
- Apply synthesis of research within a psychological framework of voice disorders.

Methods

Protocol Registration

Review criteria and methodology were specified in advance via Prospero (CRD42022352972; see Appendix D).

Eligibility Criteria

Eligible studies had to assess and compare psychological characteristics in adults with voice disorders. Voice disorders were defined using classification systems (Baker et al., 2007; Payten et al., 2022; Verdolini et al., 2006). Studies were expected to use clinical sampling methods and therefore those relying on self-reported symptoms without clinical consultation were ineligible. Studies had to investigate psychological characteristics, defined as dimensions of mental health and personality. Studies of over-arching psychological characteristics only, such as quality of life, somatisation, coping, control, stress, and global indices of functioning, were not eligible for inclusion. Studies had to use standardised measures dimensionally, rather than taxonomically, and so studies which measured psychological characteristics solely to infer epidemiology or case-frequency were ineligible.

Studies had to employ multiple-groups design(s) in which psychological characteristics were compared across case and/or control groups. Case groups were defined as groups meeting voice disorder criteria outlined above, with control groups identified as comparison group(s) without voice disorders. Therefore, single sample and correlational studies were not eligible for inclusion. Similarly, studies without comparison groups that lifted data from other studies (e.g., comparisons with normative data) were not eligible if these were the only data reported.

Unpublished works, case reports, and dissertations were not eligible. Intervention studies were eligible provided sufficient baseline data were available. All identified studies had to be published in English. No date or geographical restrictions were applied.

Information Sources & Search Strategy

Literature search was conducted using PubMed, CINAHL, Ovid (PsycInfo, MEDLINE, Embase) and Web of Science databases. The initial search was run 12th September 2022 and updated 21st April 2024 to capture eligible articles published since (search terms; Figure 1). Backwards and forwards citation searching was applied where appropriate.

Study Selection

Study selection process (Figure 1) was completed by two authors, with second author reviewing and rating 20% of title-abstracts and 25% of full-texts. Screening agreement on selection was 99.65% (κ=0.73) for title-abstract and 93.33% (κ =0.86) for full-text. Articles identified in most recent search (total=2262) were screened by lead author independently.

Data Collection Process & Items

The review followed PRISMA guidelines in the reporting and analysis of studies (Page et al., 2021). A standardised data extraction form was implemented by two authors (50% extracted by second author). Extracted data are presented in Tables 1 and 2.

Risk of Bias

Newcastle-Ottawa Scale for Case-Control studies (NOS; Wells et al., 2000) provided a relative estimate of study quality. The scale has eight criteria; with a star assigned each time criteria are met (maximum 9 stars). The scale was modified slightly to ensure relevance to review, including use of validated psychometric measures and comparisons between two or more case/control groups (Table 3). Half were joint rated, with an independent rating agreement of 84.21%.

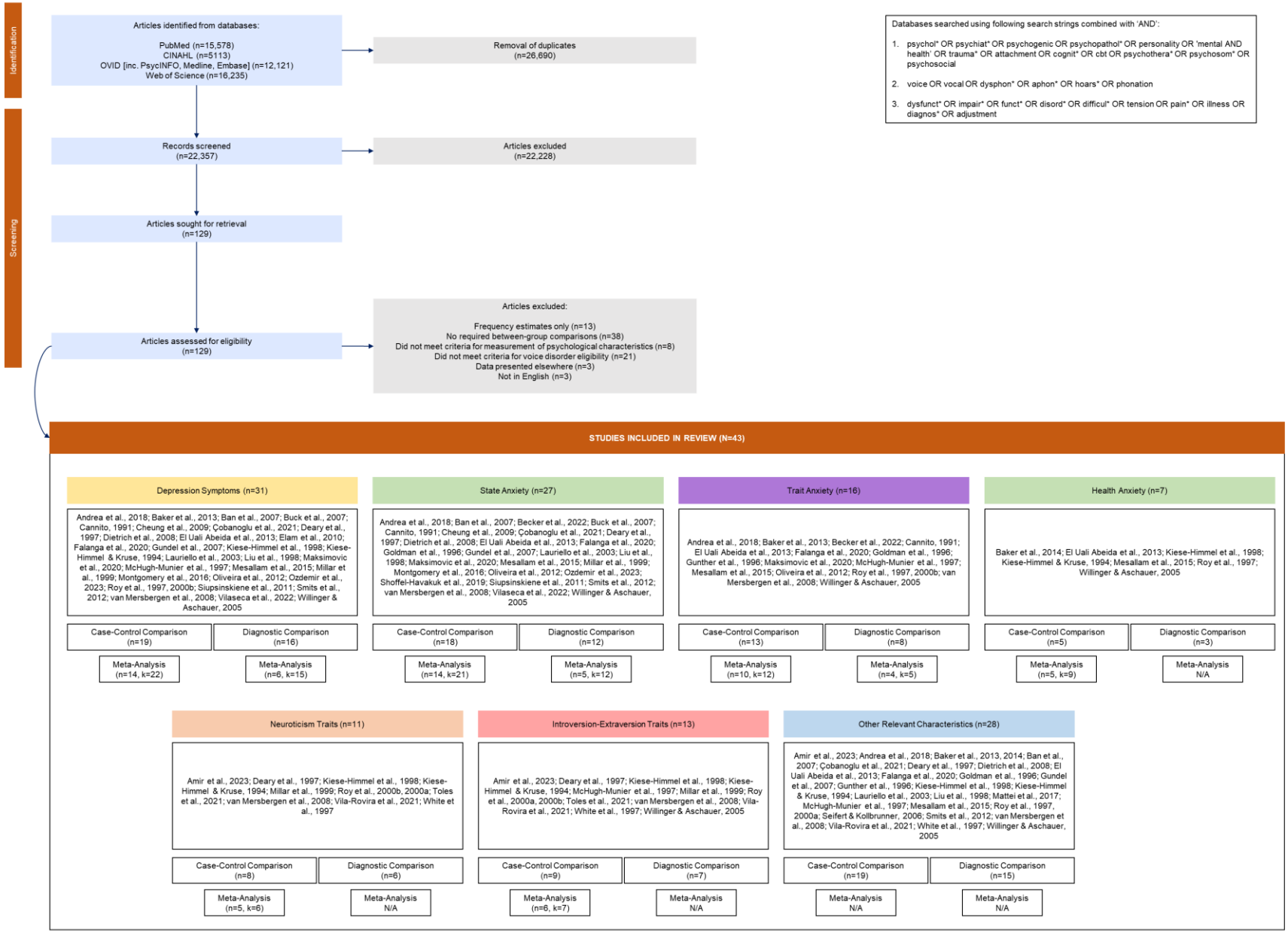
Synthesis Methods & Effect Measures

Studies were analysed per psychological characteristic, comparing studies of individuals with and without voice disorders (case-control comparison), and then different voice disorder types (diagnostic comparison). Most studies were analysed meta-analytically, with studies ineligible for meta-analysis undergoing narrative synthesis.

To be eligible for meta-analysis, studies had to report mean and standard deviations across psychological characteristics for all groups. Meta-analyses were computed for case-control comparisons and functional versus organic comparisons. Meta-analyses could not be computed for other diagnostic comparisons (e.g., different types of organic voice disorders) due to limited study availability. Subgroup effects were computed if sufficient subgroup data were available. For case-control meta-analysis, if several control groups were reported (i.e., studies with medical and healthy control groups), then only healthy control group data were included in the corresponding meta-analysis. Studies which incorporated multiple measures of the same psychological characteristic (e.g., two measures of depression symptoms) were eligible for inclusion, with each measure entered separately. The number of meta-analytic entries (k) may therefore be greater than the number of studies reviewed, with some studies entered multiple times.

All meta-analyses were run using MAJOR module in jamovi (Hamilton, 2018). Random-effects models with restricted-maximum likelihood were computed to estimate standardised mean difference (Cohen's *d*). Subgroup effects were computed separately from overall pooled effects. Heterogeneity was estimated using τ^2 and I^2, and publication bias assessed via funnel plot inspection and Egger (Egger et al., 1997) and Begg (Begg & Mazumdar, 1994) tests. Forest plots are presented (Figure 2) but are not weighted or presented in a way which accounts for study influence.

Figure 1. *Flowchart of study selection process.*



Results

Study Selection

Study selection process with second author rating as outlined above (Figure 1) filtered 22,357 initial hits through to 129 articles for full screening, resulting in 43 studies for review.

Study Characteristics

Descriptive characteristics are presented in Table 1 with a summary of findings in Table 2. Results are presented per psychological characteristic (studies listed Figure 1), with case-control differences described before comparing across voice disorder diagnoses: depression (k=31), state anxiety (k=27), trait anxiety (k=16), health anxiety (k=7), neuroticism (k=11), introversion-extraversion (k=13), and other relevant characteristics (k=28). All studies employed self-report measures of psychological characteristics, covering multi-index and characteristic-specific measures. The voice diagnostic procedures and classifications employed in the reviewed studies are presented in Table 1.

Risk of Bias

NOS ratings are presented in Table 3, with variability in relative quality across studies (mean=5.93, range=3-8). All studies employed between-groups comparisons with measures completed by all groups. Most (36/43) recruited representative clinical samples at point of referral or treatment initiation. However, there were discrepancies across studies in quality definition of case-control groups, as well as group comparability. Non-respondent rates were not reported or compared sufficiently in most studies, highlighting this as a potential reporting weakness and/or a less relevant NOS criterion for reviewed studies.

Depression Symptoms

Case-Control Comparison

Nineteen studies compared depression symptoms across groups with and without voice disorders, with fourteen eligible for meta-analysis (k=22). As shown in Figure 2, a significant difference between case-control groups in symptoms was observed, with a pooled effect size of 0.510 [95%CI 0.357-0.663, $p<.001$; $\tau^2=.081$ (SE=.040), $I^2=65.25\%$, $p<.001$]. More pronounced depression symptoms were reported in the case group in all but one study (Mesallam et al., 2015), although interpretation of this study is restricted by inadequate case definition (inferred laryngopharyngeal reflux (LPR) using Ryan score pH monitoring,with no significant group differences) meaning it may not represent a true estimate of case-control differences. Subgroup pooled effects demonstrated significantly higher depression symptoms in groups with functional voice disorder diagnoses than controls [0.778, 95%CI 0.420-1.136, $p<.001$; $\tau^2=.133$ (SE=.126), $I^2=70.44\%$, $p=.004$] and neuromuscular groups compared to controls [1.065, 95%CI 0.761-1.370, $p<.001$; $\tau^2=0.0$ (SE=.085), $I^2=0.00\%$, $p=.888$]. Smaller significant effects were seen with higher depression scores in groups with structural diagnoses than controls [0.346, 95%CI 0.177-0.515, $p<.001$; $\tau^2=.013$ (SE=.029), $I^2=25.19\%$, $p=.213$], and LPR groups than controls [0.291, 95%CI 0.051-0.530, $p=.017$; $\tau^2=.016$ (SE=.048), $I^2=25.59\%$, $p=.253$]. There was no indication of publication bias according to funnel plot inspection and Egger ($p=.099$) and Begg ($p=.144$) tests.

Five studies were not eligible for meta-analysis. Three of these (Falanga et al., 2020; Liu et al., 1998; Roy et al., 2000) reported significantly higher depression scores in individuals with voice disorders compared to controls. In contrast, two (Deary et al., 1997; Elam et al., 2010) reported mixed results, with no significant difference in symptoms in those with

vocal nodules in comparison to controls (Elam et al., 2010) and significantly higher depression scores in women, but not men, with functional dysphonia (Deary et al., 1997).

Diagnostic Comparison

Sixteen studies compared depression symptoms between voice disorder diagnoses, six of which were analysed meta-analytically comparing functional and organic groups (k=15). No significant difference in depression symptoms was observed [0.026, 95%CI -0.193–0.246, p=.812; τ^2=.375 (SE=.141), I^2= 77%, p<.001]. Indeed, six entries reported more pronounced symptoms in the functional group relative to the organic group, with eight reporting the inverse effect. It may be that methodological differences contribute to this spread of results. Studies followed different classification nosology, particularly with regards to defining functional disorders (e.g., non-organic, psychogenic, primary muscle tension dysphonia), potentially impacting the consistency of pooled effect estimates. Similarly, the large effect size observed in Andrea et al. (2018) might correspond to use of a semi-structured depression scale, in contrast to the self-report measures used elsewhere, again reducing the interpretability of the overall effect. These questions about the representativeness of the null effect are reflected in the formal assessments of publication bias, with potential funnel plot asymmetry observed (Egger-p=.012; Begg-p=.059).

Narratively synthesised studies comparing functional and organic groups reported similarly mixed associations, with significantly higher depression scores in functional compared to organic (vocal nodules and spasmodic dysphonia) groups reported in Roy et al. (2000b), but not in Buck et al. (2007) who compared functional participants to a mixed group of organic voice disorders, including vocal fold cysts, nodules, and edema. Montgomery et al. (2016) did not infer group differences, although the reported descriptive statistics indicate higher depression symptoms in organic versus functional groups.

Ten studies compared depression symptoms across organic voice disorder diagnoses. The comparisons are summarised in Table 2, highlighting considerable variability across studies with no observable pattern of difference. Indeed, most comparisons reported no significant differences in depression symptoms across organic diagnoses.

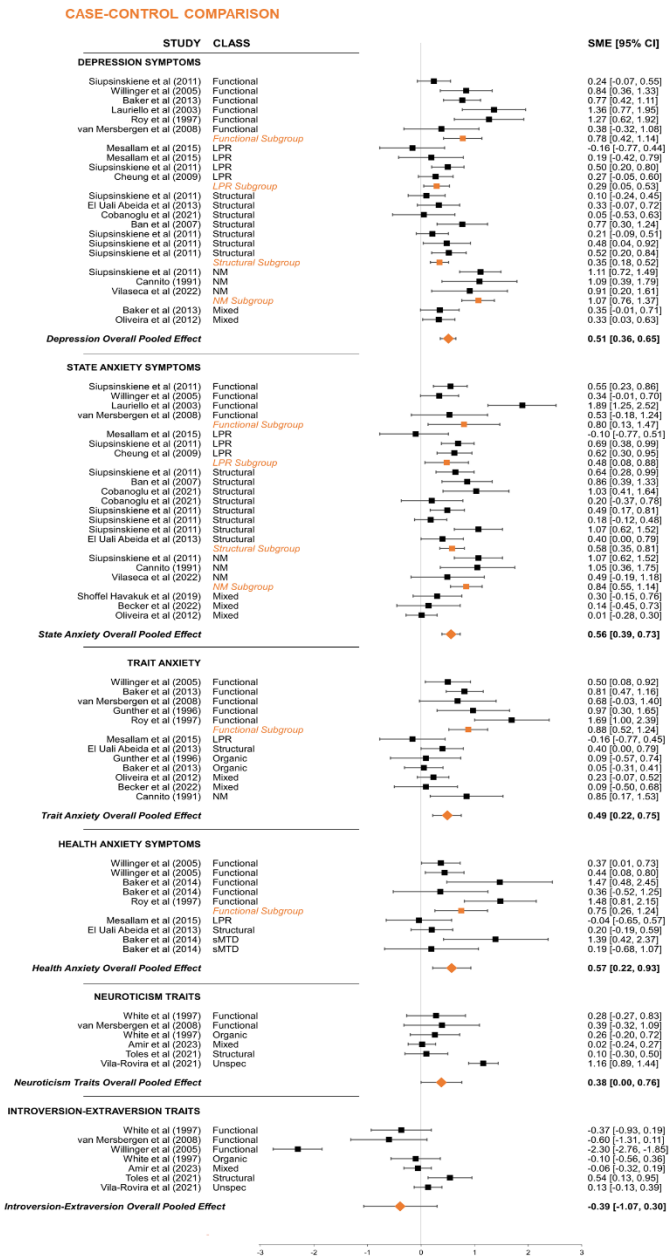
Anxiety – State

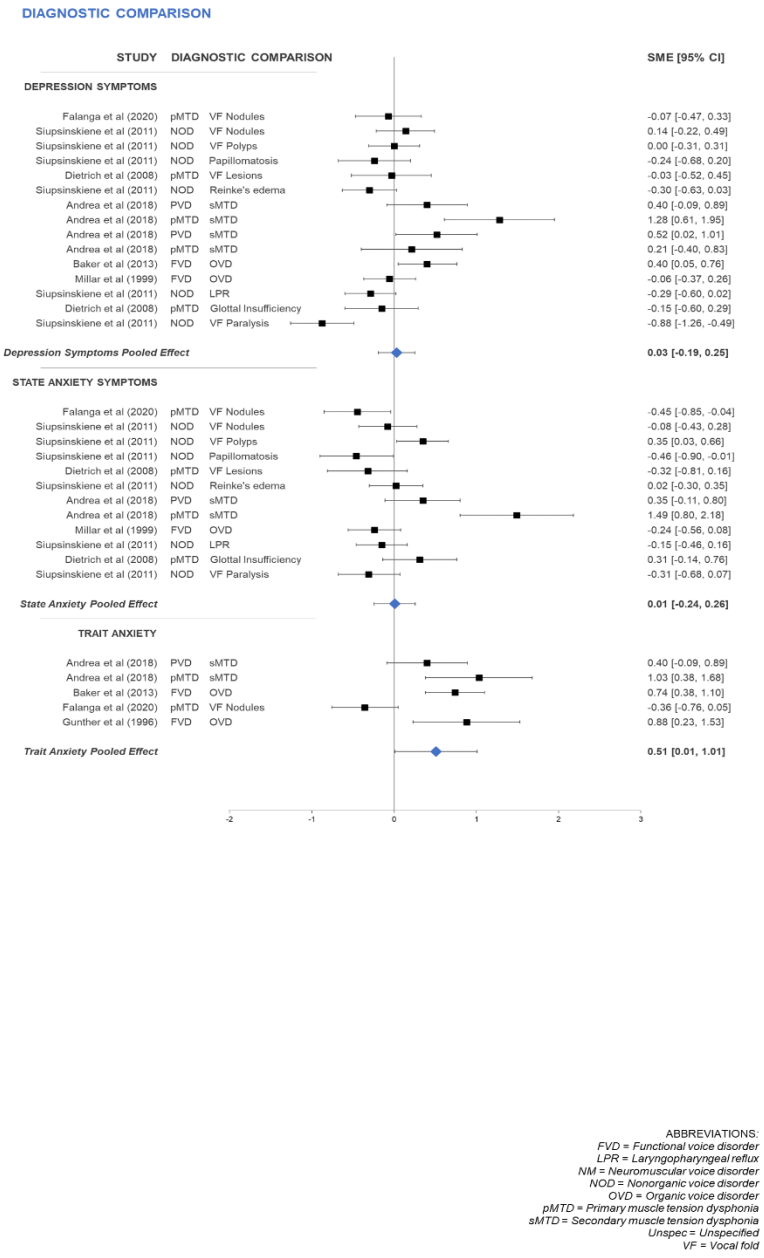
Case-Control Comparison

Eighteen studies compared state anxiety between groups with and without voice disorders, with 14 eligible for meta-analysis. Meta-analysis (k=21) revealed a significant group difference, with a pooled effect size of 0.563 [95%CI 0.393-0.733, p<.001; τ^2=.103 (SE=.049), I^2=69.96%, p<.001]. More pronounced symptoms were observed in the case group in all but one study (Mesallam et al., 2015; limitations cited above), although close to no difference was observed in Oliveira et al. (2012). Subgroup analysis estimated considerable state anxiety in groups with functional voice disorders in comparison to controls [0.801, 95%CI 0.130-1.472, p=.019; τ^2=.399 (SE=.383), I^2=88.23%, p<.001] and neuromuscular groups in comparison to controls [0.844, 95%CI 0.546-1.143, p<.001; τ^2=.0 (SE=.082), I^2=0.0%, p<.493]. Medium effect sizes were observed when comparing groups with structural diagnoses and controls [0.581, 95%CI 0.352-0.810, p<.001; τ^2=.062 (SE=.058), I^2=59.27%, p=.017] and LPR groups and controls [0.480, 95%CI 0.075-0.884, p=.020; τ^2=.085 (SE=.129), I^2=68.95%, p=.071]. As reflected in Figure 2, Lauriello et al. (2003) could have a considerable and perhaps outlying influence on the overall pooled effect, which is important given that this study has low NOS rating related to unclear case-control definition and insufficient information on anxiety scoring (used SCL-90-R, but values are presented as 0-1 which is not traditional scoring for this measure). The pooled effect estimate should perhaps therefore be interpreted with caution. There was however

no indication of publication bias according to funnel plot inspection and Egger (p=.207) and Begg (p=.294) tests.

Figure 2. *Forest plots of case-control and diagnostic comparisons per reviewed psychological characteristic*.





ABBREVIATIONS:
FVD = Functional voice disorder
LPR = Laryngopharyngeal reflux
NM = Neuromuscular voice disorder
NOD = Nonorganic voice disorder
OVD = Organic voice disorder
pMTD = Primary muscle tension dysphonia
sMTD = Secondary muscle tension dysphonia
Unspec = Unspecified
VF = Vocal fold

Table 1. *Descriptive characteristics of reviewed studies (k=43).*

Authors	Comparison	Location [a]	Case Type	Control Type	Case Group(s) Sampling Method	Diagnostic Process	Case Group(s) Physical and Psychiatric Exclusion Criteria	Groups (N, M/F; M Age, SD)
Amir et al. (2023)	Case-Control	Israel	Dysphonia – mixed type comprising structural, inflammatory, functional, and neurological diagnoses	Community	Recruitment through voice clinic, approached by research team prior to voice examination	Multidisciplinary examination featuring medical history, perceptual analysis, and video laryngo-stroboscopy	Physical: physical disabilities affecting ability to independently complete study questionnaires Psychiatric: NA	Dysphonia (100, 48/52; 48.96, 18.70) Control (149, 66/83; 40.01, 15.70)
Andrea et al. (2018)	Diagnostic	Portugal	Functional voice disorder – Psychogenic voice disorder, Primary muscle tension voice disorder Secondary muscle tension voice disorder	NA	Recruitment through voice clinic, referred for participation by ear-nose-throat specialists or speech therapists	Multidisciplinary assessment protocol including nasoendoscopy	Physical: NA Psychiatric: NA	Psychogenic voice disorder (39, 0/39; 55.1, 11.97) Primary muscle tension voice disorder (16, 0/16; 48.6, 17.50) Secondary muscle tension voice disorder (28, 0/28; 51.2, 15.04)
Baker et al. (2013)	Both Case-Control and Diagnostic	Australia	Functional voice disorder – psychogenic voice disorder, muscle tension dysphonia Organic voice disorder – vocal lesions, vocal trauma, neuromuscular conditions	Community	Recruited from public and private healthcare via speech-language therapy and laryngology	Laryngoscopic assessment by speech-language therapist and otolaryngologist	Physical = Neurological organic voice disorder Psychiatric: NA	Functional voice disorder (73, 0/73; 47.2, 10.9) Organic voice disorder (55, 0/55; 48.4, 14.5) Control (66, 0/66; 46.6, 13.9)
Baker et al. (2014)	Both Case-Control and Diagnostic	Australia	Primary muscle tension voice disorder Secondary muscle tension voice disorder	Community	Recruited following referral from voice practitioner	Laryngeal videoendoscopy and speech pathology and otolaryngologist examination	Physical: NA Psychiatric: NA	Primary muscle tension voice disorder (10, 0/10; NA) Secondary muscle tension voice disorder (10, 0/10; NA) Control [x2] (10, 0/10; NA) and (10, 0/10; NA)
Ban et al. (2007)	Case-Control	South Korea	Vocal nodules	Community	Participation following diagnosis with department of otolaryngology	Physical larynx examination by otolaryngologist and a stroboscopy	Physical: NA Psychiatric: NA	Vocal nodules (41, 041; 35.7, 10.4) Control (35, 0/35; 34.6, 9.1)
Buck et al. (2007)	Diagnostic	United Kingdom	Functional dysphonia – Dysphonia with no physical indicators Organic dysphonia – includes palsies, nodules, cysts, papilloma, and edema	NA	Recruited as new referrals from speech-language therapy departments	Nasendoscopy and speech-language assessment	Physical: NA Psychiatric: NA	Functional dysphonia (40, NA; NA) Organic dysphonia (10, NA; NA)
Becker et al., (2022)	Case-Control	USA	Common voice disorder – included those with primary muscle tension dysphonia, vocal fold lesions with or without muscle tension	Community	Recruitment through voice clinic after assessment and prior to initiation of therapy	Laryngologist and speech language pathologist examination	Physical: History of chronic medical conditions that may affect voice Psychiatric: NA	Common voice disorders (26, 4/22; 46.04, 15.11) Control (19, 5/14; 35.30, 11.41)
Cannito (1991)	Case-Control	NA	Spasmodic dysphonia – adductor, abductor, and mixed types	NA	Recruitment after clinic consultation	Examination by two speech-language therapists and an otolaryngologist, plus voice evaluation and interview	Physical: Communication disorders (other than spasmodic dysphonia), symptomatic neurologic diseases, dyskinesia or other movement issues, family history of tremors Psychiatric: All participants described as free of history of psychiatric disorders	Spasmodic dysphonia (18, 0/18; NA) Control (18, 0/18; NA)
Cheung et al. (2009)	Case-Control	Hong Kong	Laryngopharyngeal reflux	Community	Recruited after referral to laryngeal pathology laboratory	Otolaryngology examination and video strobolaryngoscopy	Physical: Laryngeal pathology other than laryngopharyngeal reflux, gastroesophageal surgery or acid-repressive therapy within prior 4 weeks, cancer, and unstable chronic illnesses Psychiatric: Major psychiatric illness	Laryngopharyngeal reflux (76, 19/57; 46.6, 9.5) Control (73, 14/59; 43.8, 11.8)
Çobanoglu et al. (2021)	Case-Control	Turkey	Vocal nodules	Hospital	Clinical prospective observational study which recruited individuals referred to otorhinolaryngology department	Diagnostic procedure not stated	Physical: Co-existence of additional laryngeal pathology and history of laryngeal surgery Psychiatric: Neuropsychiatric conditions	Vocal nodules (23, 11/12; 41.39, 7.86) Control (23, 11/12; 38.69, 8.16)
Deary et al. (1997)	Case-Control	United Kingdom	Dysphonia – type not specified	Community sample and hospital sample	Recruitment of unselected consecutive dysphonia patients	Diagnostic procedure not stated	Physical: Voice disorder caused by obvious physical problem Psychiatric: NA	Dysphonia (70, 23/47; NA) Ear-nose-throat control (90, 24/66; NA) General practice control (59, 25/34; NA)

								Healthy control (51, 25/26; NA)
Dietrich et al. (2008)	Diagnostic	NA	Primary muscle tension dysphonia – including functional dysphonia and aphonia Vocal fold lesions Glottal insufficiency	NA	Through voice centre outpatient clinic	Laryngologist physical examination with videoendoscopy and stroboscopy	Physical: Voice disorders other than those specified Psychiatric: NA	Primary muscle tension dysphonia (28, 4/24; 48.0, 11.6) Vocal fold lesions (40, 8/32; 37.8, 12.9) Glottal insufficiency (62, 27/35; 60.4, 18.4)
El Uali Abeida et al. (2013)	Case-Control	NA	Vocal nodules	Hospital	Systematically selected participants after they reported for outpatient voice treatment	Diagnosis confirmed by videolaryngostroboscopic examination	Physical: Antecedents of another laryngeal pathology and/or laryngopharyngeal reflux Psychiatric: Antecedents of psychopathology	Vocal nodules (50, 0/50; 31.92, 8.76) Control (50, 0/50; 33.42, 8.32)
Elam et al. (2010)	Case-Control	USA	Laryngopharyngeal reflux	Hospital	Prospective sample of patients who completed measures as part of voice care	Endoscopy	Physical: Cancer, other voice disorders, swallowing abnormalities related to systemic illness Psychiatric: Depression diagnosis	Laryngopharyngeal reflux (36, 11/25; 54.2, NA) Control (53, 17/36; 48.2, NA)
Falanga et al., (2020)	Both Case-Control and Diagnostic	Italy	Primary muscle tension dysphonia Vocal nodules	Mixed community and hospital sample	Prospectively enrolled from department of phoniatrics and audiology	Multidisciplinary assessment with examination and laryngovideostroboscopy	Physical: Other medical conditions, neurological or cancerous vocal pathology Psychiatric: Diagnosed psychiatric illness	Primary muscle tension dysphonia (60, NA; NA) Vocal nodules (40, NA; NA) Control (100, 15/85; 39.7, 15.13)
Goldman et al. (1996)	Both Case-Control and Diagnostic	USA	Vocal nodules Hyperfunctional voice disorders – including functional dysphonia, fatigue, edema, vocal fold thickening, and polyps		Recruited via otolaryngologists and speech-language therapists	Reviewed by otolaryngologist and speech-language therapist with use of videoendoscopic laryngeal examination including stroboscopy	Physical: History of neurological problems or clinically significant speech/hearing disorders Psychiatric: NA	Vocal nodules (27, 0/27; 29, NA) Hyperfunctional voice disorders (17, 0/17; 31.4, NA) Control (33, 0/33; 28.1, NA)
Gundel et al. (2007)	Diagnostic	NA	Spasmodic dysphonia Vocal fold paralysis	NA	Recruited participants referred for botulinum toxin treatment	Diagnostic procedure not stated	Physical: Additional neurological disorders, secondary dystonia, history of neuroleptics, and history of head and neck surgery Psychiatric: NA	Spasmodic dysphonia (50, 22/28; 57.6, 12.1) Vocal fold paralysis (27, 9/18; 52.9, 12.5)
Gunther et al. (1996)	Both Case-Control and Diagnostic	Austria	Organic - Non-recurring aphonia (defined as symptom free for at least 5 years) Functional - Recurring aphonia (defined as having symptoms within last 5 years)	Community	Opportunity sampling using records of participants who had previously received voice care	Ear-nose-throat assessment including laryngoscopic, stroboscopic, and phoniatric examinations	Physical: Organic voice disorder with clear cause Psychiatric: NA	Recurring aphonia (21, 0/21; 33.5, 8.1) Non-recurring aphonia (19, 0/19; 31.5, 9.1) Control (17, 0/17; 30.6, 9.0)
Kiese-Himmel et al. (1998)	Diagnostic	Germany	Contact granuloma Mixed voice disorder – including structural, neuromuscular, and functional diagnoses	NA	Serially recruited participants from outpatient clinic	Phoniatric and acoustic assessment including laryngomicroscope and stroboscopic examinations	Physical: NA Psychiatric: NA	Contact granuloma (47, 46/1; 51.5, 11.0) Mixed voice disorder (110, 44/66; 46.3, 12.5)
Kiese-Himmel and Kruse (1994)	Diagnostic	Germany	Contact granuloma Organic voice disorder – including polyps, cysts, edema, papillomata, and paralysis	NA	Recruited consecutive participants from outpatient clinic	Phoniatric examination with laryngoscopy and stroboscopy	Physical: NA Psychiatric: NA	Mixed organic voice disorders (36, 16/20; 42.6, 14.0) Contact granuloma (28, 27/1; 52.6, 11.1)
Lauriello et al. (2003)	Case-Control	NA	Dysfunctional dysphonia – including participants with muscle tension, edema, and nodules	NA	Recruitment strategy not stated	Diagnostic procedure not stated	Excluded those with organic voice disorders Psychiatric: NA	Dysphonia (40, 4/36; 42, NA) Ear-nose-throat control (20, 2/18; 43, NA) Healthy control (20, 2/18; 42.2, NA)
Liu et al. (1998)	Case-Control	NA	Adductor spasmodic dysphonia	Community	Recruited participants awaiting botulinum toxin treatment	Diagnosis verified by two neurologists and speech-language therapist; Not clear which diagnostic methods were used	Physical: NA Psychiatric: All participants stated to be free of reported history of psychiatric disorders	Spasmodic dysphonia (10, 2/8; 53.1, 15.6) Control (20, 4/16; 52.2, 14.3)
Maksimovic et al. (2020)	Diagnostic	Serbia	Vocal fold nodules Vocal fold polyps Vocal fold edema		Recruited participants visiting outpatient clinic for first time	Multidisciplinary assessment including otorhinolaryngological examination, phoniatric examination, and endovideolaryngostroboscopic examination	Physical: Neurological illness, malignant disease, hearing loss, uncured comorbidities, urgent phono-surgery cases Psychiatric: Confirmed psychiatric illness	Vocal fold nodules (72, 3/69; NA) Vocal fold polyps (70, 37/33; NA) Vocal fold edema (63, 7/56; NA)

Mattei et al. (2017)	Case-Control	NA	Vocal nodules	Community	Patients volunteered to participate at the end of their clinic consultation	Laryngology examination using videostroboscopy plus phoniatric and perceptual examination	Physical: Voice disorders other than nodules Psychiatric: NA	Vocal nodules (61, 0/61; 46, NA) Controls (71, 0/71; 34, NA)
McHugh-Munier et al. (1997)	Diagnostic	NA	Vocal fold nodules Vocal fold polyps	NA	Recruited following voice clinic consultation	Otolaryngologist examination featuring videostroboscopic examination	Physical: Allergy history, lung disease, neurological illness Psychiatric: Psychiatric history	Vocal fold nodules (10, 0/10; NA) Vocal fold polyps (7, 0/10; NA)
Mesallam et al., (2015)	Case-Control	Saudi Arabia	Laryngopharyngeal reflux	Hospital	Cases referred to the reflux or voice clinic with laryngopharyngeal reflux symptoms	24-hour pH monitoring	Physical: History of other forms of reflux Psychiatric: History of taking psychiatric medications	Laryngopharyngeal reflux (23, NA; NA) Control (19, NA; NA)
Millar et al. (1999)	Diagnostic	United Kingdom	Organic voice disorder - dysphonia featuring laryngeal pathology Functional voice disorder		Recruited consecutive outpatients at department of otolaryngology	Clinical history and nasolaryngoscopy with use of structured assessment tool	Physical: Previous dysphonia treatment, severe laryngeal pathology, neurological disease, upper aerodigestive tract malignancy, hearing impairment, acid reflux, multiple medical complaints, urgent intervention required, puberphonia Psychiatric: NA	Organic voice disorder (59, NA; NA) Functional voice disorder (106 - 107, NA; NA)
Montgomery et al. (2016)	Diagnostic	United Kingdom	Functional voice disorder – including functional dysphonia and phonatory gap Organic voice disorder – including laryngitis, benign vocal cord lesions, Reinke's edema, vocal cord palsy, and other	NA	Recruited consecutive new voice clinic patients	Diagnostic procedure not stated	Physical: NA Psychiatric: NA	Functional voice disorder (96, NA; NA) Organic voice disorder (81, NA; NA)
Oliveira et al. (2012)	Case-Control	Brazil	With voice complaint - Self-reported 2+ voice symptoms and 1+ vocal complaint	Community	Voice clinic referral or volunteer sampling via flyers	No formal diagnostic process reported	Physical: Oral communication disorders, acute upper respiratory infection, acute hoarseness by phono-trauma, previous voice rehabilitation, diagnosis of neurological disorder Psychiatric: Psychological diagnoses	Mixed voice disorder (87, 19/68; NA) Control (91, 29/62; NA)
Ozdemir et al. (2023)	Diagnostic	NA	Vocal fold polyps Hoarseness (unspecified cause)	NA	Recruited cases scheduled for surgery	Videolaryngostroboscopy	Physical: Vocal fold lesions other than polyps, lesions thought to be malignant, dysphonia due to systemic disease, neurological disease, gastroesophageal reflux Psychiatric: Taking psychotropic medication	Vocal fold polyp (45, 24/21; 43.0, 11.9) Hoarseness (45, 13/32; 39.1, 14.3)
Roy et al. (2000b)	Both Case-Control and Diagnostic	USA	Functional dysphonia Vocal nodules Spasmodic dysphonia Unilateral vocal fold paralysis	Hospital	Recruited consecutive participants attending outpatient clinic	Comprehensive multidisciplinary assessments with use of video and auditory examinations when indicated	Physical: History of neurological or communication disorders Psychiatric: NA	Functional dysphonia (45, 0/45; 49.0, 13.3) Vocal nodules (37, 0/37; 33.7, 9.9) Spasmodic dysphonia (35, 0/35; 55.1, 15.0) Unilateral vocal fold paralysis (15, 0/15; 53.8, 12.4) Control (37, 0/37; 45.3, 13.6)
Roy et al. (2000a)	Both Case-Control and Diagnostic	NA	Functional dysphonia Vocal nodules Spasmodic dysphonia Unilateral vocal fold paralysis	Hospital	Recruited consecutive participants attending outpatient clinic	Comprehensive multidisciplinary assessments with use of video and auditory examinations when indicated	Physical: History of neurological or communication disorders Psychiatric: NA	Functional dysphonia (45, 0/45; 49.0, 13.3) Vocal nodules (37, 0/37; 33.7, 9.9) Spasmodic dysphonia (35, 0/35; 55.1, 15.0) Unilateral vocal fold paralysis (15, 0/15; 53.8, 12.4) Control (37, 0/37; 45.3, 13.6)
Roy et al. (1997)	Case-Control	NA	Functional dysphonia	Hospital	Recruited participants from hospital speech pathology service	Perceptual, acoustic, and videolaryngoscopic examination by speech-language therapist and otolaryngologist	Physical: NA Psychiatric: NA	Functional dysphonia (25, 0/25; 44.6, 12.5) Control (19, 0/19; 45.8, 14.6)
Seifert and Kollbrunner (2006)	Diagnostic	Switzerland	Nonorganic voice disorders – including contact granuloma, psychogenic aphonia, and mutation voice disorder	NA	Selected patient group who were non-responsive to therapy and had reported psychological conflict	Ear-nose-throat examination and perceptive voice analysis	Physical: NA Psychiatric: No psychosocial stress or conflict in previous 6 months	Nonorganic voice disorder (74, 37/37; NA) Organic voice disorder (19, 6/13; NA)

			Organic voice disorder – including vocal fold paralysis					
Shoffel-Havakuk et al. (2019)	Case-Control	USA	Mixed voice disorder - comprising functional (muscle tension dysphonia) and organic (neuromuscular, lesions, atrophy, laryngitis, other)	Hospital	Recruited participants reporting to voice clinic	Diagnostic procedure not stated	Physical: NA Psychiatric: NA, 23% had existing anxiety or depression diagnosis	Mixed voice disorder (65, 25/40; 52.4, 14.9) Control (26, 10/16; 43.5, 16.1)
Siupsinskiene et al. (2011)	Both Case-Control and Diagnostic	Lithuania	Organic structural voice disorders – including Reinke's edema, vocal fold nodules, vocal fold polyps, laryngeal papillomatosis Organic inflammatory voice disorders – laryngopharyngeal reflux Organic neuromuscular voice disorders – vocal fold paralysis Functional voice disorders – nonorganic dysphonoa	Community	Recruited consecutive patients at voice clinic with benign voice disorders	Laryngologist examination, clinical history, and telescopic videolaryngoscopy	Physical: Laryngeal carcinoma, acute upper respiratory tract infections, airway obstruction, sulcus vocalis, mucosal bridges, vocal fold cysts Psychiatric: NA	Reinke's edema (69, 37/32, NA) Vocal fold nodules (51, 10/41; NA) Vocal fold polyps (84, 48/36; NA) Laryngeal papillomatosis (27, 16/11; NA) Laryngopharyngeal reflux (88, 16/72; NA) Vocal fold paralysis (44, 6/38; NA) Nonorganic dysphonia (74, 20/54; NA) Control (88, 24/64; 39.1, 10.9)
Smits et al. (2012)	Diagnostic	NA	With vocal lesion Without vocal lesion – Unspecified voice disorder	NA	Recruited participants from outpatient clinic	Laryngostroboscope examination	Physical: NA Psychiatric: NA	Vocal fold lesions (43, 0/43; NA) Unspecified voice disorder (39, 0/39; NA)
Toles et al. (2021)	Case-Control	USA	Vocal nodules	Community	Convenience sample though voice centre	Laryngologist and speech-language examination including videostroboscopy	Physical: Recently completed voice therapy, history of laryngeal surgery Psychiatric: NA	Vocal nodules (47, 0/47; 21.4, 4.3) Controls (47, 0/47; 22.5, 4.8)
van Mersbergen et al. (2008)	Case-Control	NA	Functional dysphonia	Community	Recruited participants through announcements given to their health care professionals	Videostroboscopy used to observe absence of organic features and thereby infer functional voice disorder	Physical: NA Psychiatric: NA	Functional dysphonia (12, 0/12; 42.4, NA) Controls (23, 0/23; 28.6, NA)
Vila-Rovira et al. (2021)	Case-Control	Spain	Voice disorder – type(s) not specified	Community	Recruited cases referred to voice clinic who were about to begin speech therapy	Diagnosed by otolaryngologist but diagnostic procedure not stated	Physical: History of neoplastic disorders, neurological disorders, presbyphonia Psychiatric: NA	Unspecified voice disorder (141, 24/117; NA) Control (99, 14/85; NA)
Vilaseca et al, (2022)	Case-Control	Spain	Spasmodic dysphonia	Hospital	Volunteer sample from consecutive patients attending movement disorder unit	Diagnosed by neurologist or otolaryngologist using flexible fiberlaryngoscopy	Physical: NA Psychiatric: NA	Spasmodic dysphonia (17, 3/14; 63.65, 11.19) Control (17, 3/14; 68.53, 7.37)
White et al. (1997)	Both Case-Control and Diagnostic	United Kingdom	Psychogenic voice disorder Organic voice disorder – including laryngitis, vocal fold cysts, vocal fold nodules, Reinke's edema, vocal cord palsy, and subepithelial haemorrhage	Hospital	Recruited participants as consecutive voice clinic attendees	Comprehensive assessment including history, SLT assessment, video laryngoscopy, and video stroboscopy	Physical: NA Psychiatric: NA	Psychogenic voice disorder (18, 0/18; 43.8, 18.3) Organic voice disorder (33, 0/33; 45.1, 13.7) Control (42, 0/42; 46.7, 13.8)
Willinger and Aschauer (2005)	Case-Control	Austria	Functional dysphonia – defined as conversion disorder	Community	Recruited participants reporting for treatment at department of phoniatrics and logopaedics	Laryngoscopy and phonic evaluation	Physical: NA Psychiatric: All fulfilled criteria for conversion disorder	Functional dysphonia (61, 13/48; 36, 13) Control (61, 13/48; 36, 13)

[a] = Location of clinic had to be specified in order to be extracted; NA = Information not provided or insufficient information provided

Table 2. *Key findings of reviewed studies (k=43).*

Authors	Psychological Measures	Key Findings		Significant Correlations Between Voice Indices and Psychological Characteristics
		Case-Control and Functional-Organic comparisons	**Organic voice disorder comparisons**	
Amir et al. (2023)	NEO-FFI	Lower Openness scores in Dysphonia than control No other significant group differences in personality dimensions		Negative correlation between Openness and Breathiness Negative correlation between Extraversion and VHI emotional subscale
Andrea et al. (2018)	HRSD; HRSA; TEMPS-A	Higher anxiety and depression in pMTD than PVD and sMTD		Positive correlation between VHI scores and depression and anxiety in PVD Positive correlation between VHI total, emotional subscale, and functional subscale, and depression in sMTD
Baker et al. (2013)	SAQ-N; MAS-SF; MCSDS; AOEE-Q; FOEAS; LEDS; ASI	Significant differences between groups in anxiety, anger, and depression scores, with highest scores in FVD Greater ambivalence over-emotional expression in FVD Higher likelihood of insecure attachment style in FVD More severe and difficult life (conflict over speaking out) events in FVD Supplementary analysis split FVD to compare PVD and pMTD types, finding few significant differences between groups other than higher frequency of traumatic (conflict over speaking out) events in PVD		Correlations not computed/reported
Baker et al. (2014)	LEAS; TAS-20; AIB	Higher alexithymia scores in pMTD than sMTD and CL Higher illness affirmation scores in combined case group than control group Higher adaptive and maladaptive coping scores in sMTD than pMTD		Negative correlation between vocal load and alexithymia (total, externally oriented thinking) Positive correlation between voice symptom impact and level of emotional awareness
Ban et al. (2007)	SCL-90-R	Significant differences between VN and CL on 8/9 subscales (all apart from paranoid ideation) Secondary analysis compared acute cases of VN (hoarseness <1 year) with chronic cases of VN (hoarseness >1 year), with chronic group scoring higher than acute and CL on obsessive-compulsive, depression, and hostility subscales		Correlations not computed/reported
Becker et al. (2022)	STAI	Intervention study so only baseline data analysed No significant group differences in state and trait anxiety		Correlations not computed/reported
Buck et al. (2007)	HADS	Higher rates of anxiety were reported in FVD than OVD No differences in depression reported between FVD and OVD		Positive correlations between anxiety and illness perception (R range = 0.33-0.39)
Cannito (1991)	ZDS; STAI	Higher depression and anxiety in SD than CL Supplementary analysis comparing SD participants with different tremor, severity, and spasm types, revealed no significant differences in depression and anxiety		No significant correlation between dysphonia severity and depression and anxiety
Cheung et al. (2009)	HADS	Higher anxiety in LPR than CL No significant difference in depression between LPR and CL LPR comorbid with GERD reported significantly higher depression scores than those with LPR without GERD		Correlations not computed/reported
Çobanoglu et al. (2021)	BSI; BAI	Intervention study so only baseline data analysed Higher anxiety, hostility, and phobic anxiety in VN than CL		No significant correlation between VHI and anxiety Positive correlation between VHI and BSI total, subscale correlations not reported
Deary et al., (1997)	EPQ-R-SF; TAS-20; HADS; UWIST	Higher neuroticism in DYS women than GP-CL, higher introversion-extraversion in DYS women than ENT-CL, Higher anxiety and depression in DYS women than GP-CL and CL, and significantly higher difficulty describing feelings in DYS women than CL No significant difference between DYS men and CL groups		Correlations not computed/reported
Dietrich et al. (2008)	HADS		No difference in depression between VFL and GI Higher state anxiety in VFL than GI	Correlations not computed/reported
El Uali Abeida et al. (2013)	MMPI-2	Higher psychasthenia, hypomania, anxiety, anger, type-a behaviour, poignancy, bizarre sensory experiences, and psychomotor acceleration in VN than CL Age, voice use, profession, and psychomotor acceleration associated with presence VN as per binary logistic regression model		Correlations not computed/reported
Elam et al. (2010)	BDI-FS	No significant difference in depression between LPR and CL		Positive correlation between depression and VHI-depression
Falanga et al., (2020)	BDI; STAI	Higher anxiety in VN than pMTD No significant differences in depression between VN and pMTD Higher depression and anxiety in combined clinical group (pMTD and VN together) compared to CL		Correlations not computed/reported

Goldman et al. (1996)	SRE; STAI	More significant life events in HVD than CL Higher state and trait anxiety in VN and HVD compared to CL, but no difference between VN and HVD		Correlations not computed/reported
Gundel et al. (2007)	SCL-90-R; MEL	No differences between groups in subscale scores 32% of SD reported stressful life event(s) in the year prior to onset versus 7.4% in VFP	No difference in depression or state anxiety between SD and VFP	Positive correlation between SD severity and psychiatric morbidity as estimated by psychiatric examination
Gunther et al. (1996)	GATI; SAS	Higher trait anxiety in RA than NRA and CL Higher propriety in RA than CL		Correlations not computed/reported
Kiese-Himmel et al. (1998)	FPI; IAQ; DS	CG present with more 'norm deviant' scores than MVD Logistic regression (with case group as outcome variable) was run, identifying fear of physical lesions, fear of appearing in public, achievement orientation, and introversion as risk factors for CG case group allocation	Formal comparisons between CG and MVD not computed	Correlations not computed/reported
Kiese-Himmel and Kruse (1994)	FPI; DS; IAS; ILE	Higher inhibition and anxiety about appearing in public in CG than MOVD MOVD reported as slightly more affected by significant life events, according to both reported frequency and intensity	Higher depression in CG than MOVD No difference in neuroticism or introversion-extraversion between groups	Correlations not computed/reported
Lauriello et al. (2003)	SCL-90-R	Higher anxiety and depression in DYS than CL Higher obsessive-compulsive, interpersonal sensitivity, hostility, and phobia in DYS than CL		Correlations not computed/reported
Liu et al. (1998)	HDRS; HARS; ZDS; SCL-90-R	Higher depression, obsessive-compulsive, anxiety, and psychoticism in SD than CL		Correlations not computed/reported
Maksimovic et al. (2020)	BDI; STAI		Higher depression in VN and VFE than VP, with no difference between VN and VFE Higher state and trait anxiety in VN than VP and VFE, with no difference between VP and VFE	Depression severity (as grouped as mild, moderate, severe, rather than analysed dimensions) associated with VHI
Mattei et al. (2017)	TCI	Higher novelty seeking (including subscales) and persistence dimensions in VN than CL Lower harm avoidance and all corresponding subscales in VN than CL Lower self-acceptance in VN than CL Higher self-transcendence in VN than CL		Correlations not computed/reported
McHugh-Munier et al. (1997)	PI	Higher dominance and lower altruism in VP than VN	No difference in depression, trait anxiety, and introversion-extraversion between VN and VP	Correlation between problem acceptance and voice median fundamental frequency
Mesallam et al., (2015)	SRRS; SCL-90-R; TMAS; MMPI; ZDS	No significant differences between LPR and CL across measures		No significant correlations between psychological measures and VHI, RSI, or pH readings
Millar et al. (1999)	HADS; EPQ-R	Higher extraversion in OVD than FVD		Correlations not computed/reported
Montgomery et al. (2016)	HADS	Groups only compared formally based on caseness which is not an outcome of this review Looking at the data, depression scores were higher in OVD (Median = 8, IQR = 8) than FVD (Median = 5.5, IQR = 5), and anxiety scores were higher in OVD (Median = 7, IQR 8) than FVD (Median = 4, IQR = 6) Markedly higher depression in VCP (Median = 14, IQR = 6) than other groups		Significant correlation between VoiSS and depression and anxiety
Oliveira et al. (2012)	BDI, STAI	No significant difference between MVD and CL in depression or state/trait anxiety		Correlations not computed/reported
Ozdemir et al. (2023)	DASS-42		No significant differences between groups in depression and anxiety scores	Significant correlations between depression and anxiety scores and RSI and voice functioning measures
Roy et al. (2000b)	EPQ, STAI, BDI	Higher extraversion in VN than FD, SD, and UVFP, but no difference compared to CL Lower extraversion in FD and UVFP groups than CL Higher neuroticism in FD than SD, UVFP, and CL Higher psychoticism in VN than FD, SD, and CL Higher trait anxiety in FD than VN, SD, UVFP, and CL Higher depression in FD than VN (not statistically significant when age corrected), SD, and CL A lot of the analysis is dedicated to discrimination of caseness based on measures (and whether test values predicted diagnosis using region under curve analysis) which is not a focus of this review	No difference in depression, trait anxiety, or neuroticism between VN, SD, and UVFP groups Higher extraversion in VD than SD and UVFP, no difference between SD and UVFP	No significant correlation between VHP and psychological measures
Roy et al. (2000a)	MPQ	Higher positive emotionality in VN than FD and SD Higher negative emotionality in FD than UVFP and CL, with FD scoring higher on stress reactivity than other groups Lower constraint in VN than SD and CL (not significant when age-adjusted), and higher constraint in FD than CL At lower trait level, results were suggestive of different personality characterisations of VN and FD: authors characterise FD as associated with neuroticism and introversion, and VN as associated with extraversion, social potency, and aggression/reactivity Study had focus on discrimination analysis which is not a focus of this review	No difference in negative emotionality between VN, SD, and UVFP groups Higher positive emotionality in VN than SD and UVFP, with no difference between SD and UVFP	Correlation between VHP and absorption in FD

Roy et al. (1997)	MMPI	Higher hypochondriasis, depression, hysteria, paranoia, psychasthenia, schizophrenia, and social introversion, in FD than CL		Correlations not computed/reported
Seifert and Kollbrunner (2006)	GT, PFT	Higher social resonance, social permeability, social potency, imagination, receptivity in love affairs, love giving, in NOVD than OVD, NOVD less concerned about having an easy life than OVD Higher expectation people will provide solutions, and the needs resistance reaction type in NOVD than OVD, with more lay blame on others, denial of frustration, and pure aggression against others in OVD than NOVD		Correlations not computed/reported
Shoffel-Havakuk et al. (2019)	GAD-7	No difference in anxiety between case and CL groups		Correlation between anxiety and self-reported voice catastrophising
Siupsinskiene et al. (2011)	HADS	Higher anxiety and depression in combined clinical group than CL Higher anxiety in VN, RE, Pp, LPR, VP, NOD than CL Higher depression in VFP, RE, and LPR than CL	Higher depression in VFP than all comparison groups, with no other significant depression differences between groups Higher state anxiety in VN than VP, RE than VP, Pp than VP, LPR than VP, VFP than VP, no other significant differences in state anxiety between groups	Correlation between VHI and anxiety and depression
Smits et al. (2012)	SCL-90-R	No significant differences between VFL and UVD	No difference in depression or state anxiety between VFL and UVD	No significant correlations between DSI and psychological measures
Toles et al. (2021)	MPQ-BF	Higher positive emotionality in VN than CL, with greater social potency and social closeness in VN than CL Trait scores were also entered into models to examine their discriminant value, but this is not an outcome of focus for this review		Negative correlation between neck surface acceleration magnitude skewness and positive emotionality Negative correlation related to difference between positive emotionality scores and harmonic magnitudes in VN
van Mersbergen et al. (2008)	MPQ-BF; STAI; BDI; LSAS	Only baseline data extracted Higher social anxiety in FD than CL		Correlations not computed/reported
Vila-Rovira et al. (2021)	EPQ-R-SF; SPSRQ	Higher neuroticism and sensitivity to punishment in UVD than CL No differences in introversion-extraversion between UVD and CL Higher scores on neuroticism and introversion-extraversion significantly predicted allocation to case group		Positive correlation between neuroticism and sensitivity to punishment scores and VHI and GRBAS scores Positive correlation between sensitivity to reward score and VHI score Negative correlations between neuroticism and sensitivity to punishment and DSI score
Vilaseca et al. (2022)	HADS	Higher depression in SD than control No difference in anxiety scores		Correlation between total HADS score and presence of non-motor symptoms
White et al. (1997)	EPQ; HOQ	No differences between PVD, OVD, and CL		Correlations not computed/reported
Willinger and Aschauer (2005)	TPQ; FPI; IAQ; BDI; STAI	Higher harm avoidance, fear of illness, depression, trait anxiety, and health concern in FD than CL Higher extraversion in CL than FD		Correlations not computed/reported

AIB = Abnormal Illness Behaviour (Pilowsky, 1997); AOEE-Q = Ambivalence Over-Emotional Expression Questionnaire (King & Emmons, 1990); ASI = Attachment Style Interview (Bifulco, 2014); BAI = Beck Anxiety Inventory (Beck et al., 1993); BDI = Beck Depression Inventory (Beck et al., 1987); BDI-FS = Beck Depression Inventory-Fast Screen (Beck et al., 2000); BSI = Brief Symptom Inventory (Derogatis, 1983); CG = Contact granuloma; CL = Control; DS = Depressivity Scale (Zerssen & Koller, 1976); DSI = Dysphonia Severity Index (Wuyts et al., 2000); DYS = Dysphonia; ENT-CL = Ear-nose-throat control; EPQ = Eysenck Personality Questionnaire (Eysenck & Eysenck, 1975); EPQ-R = Eysenck Personality Questionnaire-Revised (Eysenck & Eysenck, 1993); EPQ-R-SF = Eysenck Personality Questionnaire Revised Short Form (Eysenck et al., 1985); FD = Functional dysphonia; FOEAS = Family of Origin Expressive Atmosphere Scale (Yelsma et al., 2000); FPI = Freiburg Personality Questionnaire (Fahrenberg et al., 1989); FVD = Functional voice disorder; GATI = German Version Anxiety Trait Inventory (Spielberger et al., 1971); GAD-7 = Generalised Anxiety Disorder Assessment (Spitzer et al., 2006); GERD = Gastroesophageal reflux; GI = Glottal insufficiency; GP-CL = General practice controls; GRBAS = GRBAS (grade, roughness, breathiness, asthenia, strain); GT = Giessen Test (Beckmann et al., 1997); HADS = Hospital Anxiety and Depression Scale (Zigmond & Snaith, 1983); HOQ = Hysteroid-Obsessoid Questionnaire (Caine & Hope, 1967); HRSA = Hamilton Rating Scales for Anxiety (Hamilton, 1959) ; HRSD = Hamilton Rating Scales for Depression (Hamilton, 1960); HVD = Hyperfunctional voice disorder; IAQ = Interaction Anxiety Questionnaire (P. Becker, 1997); ILE = Inventory of Life Events (Siegrist & Dittman, 1984); LEAS = Levels of Emotional Awareness Scale (Lane et al., 1990); LEDS = Life Events and Difficulties Schedule (Brown & Harris, 1978); LPR = Laryngopharyngeal reflux; LSAS = Leibowitz Social Anxiety Scale (Liebowitz, 1987); MAS-SF = Manifest Anxiety Scale-Short Form (Bendig, 1956); MCSDS = Marlowe-Crowne Social Desirability Scale (Crowne & Marlowe, 1960); MEL = Munchner Ereignis Liste (Maier-Diewald, 1983); MMPI = Minnesota Multiphasic Personal Inventory (Hathaway & McKinley, 1972); MMPI-2 = Minnesota Multiphasic Personality Inventory-2 (J. N. Butcher et al., 1989); MOVD = Mixed organic voice disorder; MPQ = Multidimensional Personality Questionnaire (Tellegen, 1982); MPQ-BF = Multidimensional Personality Questionnaire- Brief Form (Patrick et al., 2002); MVD = Mixed voice disorder; NEO-FFI = NEO Five Factor Inventory (Etzion & Laski, 1998); NOD = Nonorganic dysphonia; NOVD = Nonorganic voice disorder; NRA = Non-recurring aphonia; OVD = Organic voice disorder; PFT = Picture Frustration Test (Rauchfleisch et al., 1979); PI = Personality Index; pMTD = Primary muscle tension dysphonia/Primary muscle tension voice disorder; Pp = Papillomatosis; PVD = Psychogenic voice disorder; RA = Recurring aphonia; RE = Reinke's edema; SAQ-N = Self-Assessment Questionnaire-Nijmegen (Van der Ploeg, 1989); SAS = Social Assertiveness Scale (Ullrich & Ullrich, 1977); SCL-90-R = Symptom Checklist 90 Revised (Derogatis, 1977); SD = Spasmodic dysphonia; sMTD = Secondary muscle tension dysphonia/Secondary muscle tension voice disorder; SPSRQ = Sensitivity to Punishment and Sensitivity to Reward Questionnaire (Torrubia et al., 2001); SRE = Schedule of Recent Experience (Holmes & Rahe, 1967a) ; SRRS = Social Readjustment Rating Scale (Holmes & Rahe, 1967b); STAI = State Trait Anxiety Inventory (Spielberger et al., 1971); TAS-20 = Toronto Alexithymia Scale 20 (Bagby et al., 1994); TCI = Temperament and Character Inventory (Cloninger et al., 1994); TEMPS-A = Temperament Evaluation of Memphis Pisa, Paris, and San Diego-Auto (Akiskal et al., 2005); TMAS = Taylor Manifest Anxiety Scale (J. A. Taylor, 1953); TPQ = Tridimensional Personality Questionnaire (Cloninger, 1987); UVD = Unspecified voice disorder; UVFP = Unilateral vocal fold paralysis; UWIST = UWIST Mood Adjective Checklist (Matthews et al., 1990); VFE = Vocal fold edema; VFL = Vocal fold lesion; VFP = Vocal fold paralysis; VHI = Vocal Handicap Index (Jacobson et al., 1997); VHP = Voice Handicap Profile; VN = Vocal nodules; VoiSS = Voice Symptom Scale (Deary et al., 2003); VP = Vocal polyps; ZDS = Zung Self-Rating Depression Scale (Zung, 1965).

Table 3. *Newcastle-Ottawa scale ratings for case-control studies.*

Items adjusted to fit scope of review e.g., award point to self-report measures of psychological characteristics; ***** *= criteria met,* **-** *= criteria not met.*

Authors	**Comparison Type**	**Selection**				**Comparability**		**Exposure**			**Relative quality rating**
		Adequate case definition *Two or more practitioners diagnosing and/or two or more assessment techniques*	**Representativeness of cases** *Manuscript states that recruitment was consecutive and/or recruitment from voice clinic and/or representative referrals*	**Selection of comparison groups)** *Control groups: recruited from general community setting* *Case groups: All diagnostic groups recruited in the same way*	**Definition of comparison group(s)** *Control groups: No history of voice disorder* *Case groups: Same diagnostic methods used for all diagnostic groups*	**Group matching criteria 1 (gender)** *Gender frequency reported across groups and differences statistically analysed, with full in-text description of corresponding inferential statistics; Any significant differences are accounted for within group analysis*	**Group matching criteria 2 (age)** *Age reported across groups and differences statistically analysed, with full-in text description of corresponding inferential statistics; Any significant differences are accounted for within group analysis of psychological characteristics*	**Ascertainment of exposure** *Validated measure of psychological characteristic*	**Same method of ascertainment** *Use of same measure of psychological characteristics across groups*	**Non-respondents** *Defined as number of participants who did not complete measures, stated and same per group*	
Amir et al. (2023)	Case-Control	*	*	*	*	*	*	*	*	-	8
Andrea et al. (2018)	Diagnostic	*	*	*	*	*	*	*	*	-	8
Baker et al. (2013)	Both Case-Control and Diagnostic	*	*	*	*	*	*	*	*	-	8
Baker et al. (2014)	Both Case-Control and Diagnostic	*	*	*	*	*	*	*	*	-	8
Ban et al. (2007)	Case-Control	*	*	*	*	*	*	*	*	-	8
Becker et al. (2022)	Case-Control	*	*	*	*	-	-	*	*	-	6
Buck et al. (2007)	Diagnostic	*	*	*	*	-	-	*	*	-	6
Cannito (1991)	Case-Control	*	-	-	-	*	-	*	*	-	4
Cheung et al. (2009)	Case-Control	*	*	*	-	*	*	*	*	-	7
Çobanoglu et al. (2021)	Case-Control	-	*	-	-	*	*	*	*	-	5
Deary et al. (1997)	Case-Control	-	*	*	-	*	*	*	*	-	6
Dietrich et al. (2008)	Diagnostic	*	*	*	*	*	-	*	*	-	7
El Uali Abeida et al. (2013)	Case-Control	-	-	-	*	*	*	*	*	-	5
Elam et al. (2010)	Case-Control	-	*	-	*	*	*	*	*	-	6
Falanga et al. (2020)	Both Case-Control and Diagnostic	*	*	-	*	*	*	*	*	-	7
Goldman et al. (1996)	Both Case-Control and Diagnostic	*	*	*	*	*	-	*	*	-	7
Gundel et al. (2007)	Diagnostic	-	*	-	-	-	-	*	*	-	3

Gunther et al. (1996)	Both Case-Control and Diagnostic	*	-	*	-	*	-	*	*	-	5
Kiese-Himmel et al. (1998)	Diagnostic	*	*	*	*	-	-	*	*	-	6
Kiese-Himmel & Kruse (1994)	Diagnostic	*	*	-	*	*	-	*	*	-	6
Lauriello et al. (2003)	Case-Control	-	-	-	-	-	-	*	*	*	3
Liu et al. (1998)	Case-Control	*	*	*	*	-	*	*	*	-	7
Maksimovic et al. (2020)	Diagnostic	*	*	*	*	-	-	*	*	-	6
Mattei et al. (2017)	Case-Control	*	*	*	*	*	-	*	*	-	7
McHugh-Munier et al. (1997)	Diagnostic	-	*	*	*	*	-	*	*	-	6
Mesallam et al. (2015)	Case-Control	-	*	-	-	-	-	*	*	-	3
Millar et al. (1999)	Diagnostic	*	*	*	*	-	-	*	*	-	6
Montgomery et al. (2016)	Diagnostic	-	*	*	-	-	-	*	*	-	4
Oliveira et al. (2012)	Case-Control	-	-	*	-	*	*	*	*	-	5
Ozdemir et al. (2023)	Diagnostic	*	*	*	-	-	-	*	*	*	6
Roy et al. (2000b)	Both Case-Control and Diagnostic	*	*	-	*	*	*	*	*	-	7
Roy et al. (2000a)	Both Case-Control and Diagnostic	*	*	-	*	*	*	*	*	-	7
Roy et al. (1997)	Case-Control	*	*	-	*	*	-	*	*	-	6
Seifert & Kollbrunner (2006)	Diagnostic	*	-	-	*	-	-	*	*	-	4
Shoffel-Havakuk et al. (2019)	Case-Control	-	*	-	*	*	-	*	*	-	5
Siupsinskiene et al. (2011)	Both Case-Control and Diagnostic	*	*	*	*	*	*	*	*	-	8
Smits et al. (2012)	Diagnostic	-	*	*	-	*	-	*	*	-	5
Toles et al. (2021)	Case-Control	*	*	*	*	*	-	*	*	-	7
van Mersbergen et al. (2008)	Case-Control	-	-	*	*	*	*	*	*	-	6
Vila-Rovira et al. (2021)	Case-Control	-	*	*	*	-	-	*	*	-	5
Vilaseca et al. (2022)	Case-Control	*	*	-	-	-	-	*	*	-	4
White et al. (1997)	Both Case-Control and Diagnostic	*	*	-	-	*	-	*	*	-	5
Willinger & Aschauer (2005)	Case-Control	*	*	*	-	*	*	*	*	-	7

Differences between individuals with and without voice disorders in state anxiety were also observed in the narratively synthesised studies. All four (Deary et al., 1997; Falanga et al., 2020; Goldman et al., 1996; Liu et al., 1998) reported higher state anxiety scores in case groups than controls, with significantly higher scores observed across functional and organic groups in comparison to controls.

Diagnostic Comparison

Twelve studies compared state anxiety across voice disorder diagnoses, with five included in meta-analysis of functional and organic groups (k=12). Like depression symptoms, there was no meta-analytic evidence of group differences in state anxiety [0.007, 95%CI -0.244-0.257, p=.958; τ^2=.152 (SE=.083), I^2=79.71%, p<.001]. A mixed pattern of results was observed, with higher state anxiety scores in functional groups in five entries but higher state anxiety scores in organic groups in seven entries, again likely related to qualitative and diagnostic differences across functional and organic disorders. Tests of publication bias indicated potential funnel plot asymmetry (Egger-p=.025; Begg-p=.737), limiting the representativeness of the pooled effect.

Studies not eligible for meta-analysis provided no clear evidence of differences in state anxiety between functional and organic groups. Buck et al. (2007) made comparisons between those with no physical indicators of vocal pathology (functional) and those with a range of structural and neuromuscular voice problems (organic) and reported more pronounced state anxiety in functional versus organic groups, with the inverse suggested (but not explicitly implied as no inferential comparisons run) in Montgomery et al. (2016). Goldman et al. (1996) compared those with vocal nodules (organic) with a group of individuals with a mix of 'hyperfunctional' voice disorders, comprised predominantly of functional and fatigue diagnoses with some edema, polyps, and vocal fold thickening, reporting no significant group differences in state anxiety.

Six studies compared state anxiety across organic voice diagnoses. Groups diagnosed with vocal polyps scored significantly lower on state anxiety than other organic groups in two studies (Maksimovic et al., 2020; Siupsinskiene et al., 2011) but further systematic investigation is required before inferring a diagnostic difference based on this. Most of the organic comparisons reported no significant differences in state anxiety between groups with different organic diagnoses (Table 2).

Anxiety – Trait

Case-Control Comparison

Thirteen studies compared trait anxiety across groups with and without voice disorders, nine of which were meta-analysed (k=12). Case-control groups significantly differed on trait anxiety, with a pooled effect size of 0.485 [95%CI 0.222-0.749, $p<.001$; $\tau^2=.144$ (SE=.091), $I^2=71.28\%$, $p<.001$]. Subgroup effects were calculated for studies comparing trait anxiety in functional voice disorders and controls only, owing to the small number of eligible studies available for other subgroups, revealing a large difference in trait anxiety [0.880, 95%CI 0.518-1.242, $p<.001$; $\tau^2=.091$ (SE=.120), $I^2=56.1\%$, $p=.071$]. Roy et al. (1997) could be considered a potential outlier, which could be related to the use of psychasthenia subscale scores as a proxy for trait anxiety when psychasthenia scores might instead represent a cluster of anxiety experiences (Friedman et al., 2014); however, there was no indication of publication bias according to funnel plot inspection and Egger ($p=.247$) and Begg ($p=.153$) tests.

Similar effects were observed in all three studies ineligible for meta-analysis (Falanga et al., 2020; Goldman et al., 1996; Roy et al., 2000b), all reporting significantly more trait anxiety in individuals with voice disorders than controls.

Diagnostic Comparison

Eight studies compared trait anxiety across groups with different voice diagnoses. Four were included in the meta-analysis of functional and organic groups (k=5) [0.510, 95% CI 0.010-1.009, $p = .045$; $\tau^2 = .256$ (SE=.229), $I^2 = 80.84\%$, $p < .001$], with higher trait anxiety scores observed in functional groups in most entries. No risk of bias was identified (Egger-p=.236; Begg-p=.817), although it should be noted that this is only a marginally significant pooled effect potentially influenced by the large group difference observed in Falanga et al. (2020) who compared trait anxiety across primary muscle tension dysphonia and vocal nodule groups.

This meta-analytic difference between functional and organic groups was also observed descriptively, with Roy et al. (2000b) reporting more prominent trait anxiety in functional versus organic (vocal nodules; spasmodic dysphonia; unilateral vocal fold paralysis) groups. However, this is contrasted by Goldman et al. (1996) who did not report a significant difference between 'hyperfunctional' and organic groups in trait anxiety. Comparisons of trait anxiety between organic voice disorder groups were mixed, with only Maksimovic et al. (2020) reporting significant group differences in trait anxiety, shown as greater anxiety in vocal nodule in comparison to vocal polyp and edema groups (Table 2).

Health Anxiety Symptoms

Case-Control Comparison

Five studies compared health anxiety symptoms between groups with and without voice disorders, all of which were meta-analysed (k=9) revealing a significant difference between groups, with a pooled effect size of 0.575 [95%CI 0.217-0.933, p=.002; τ^2=.187 (SE=.147), I^2=69.96%, p=.006]. Subgroup analysis revealed significantly more health anxiety symptoms in functional voice disorders than controls [0.750, 95%CI 0.260-1.239,

p=.003; τ^2 =.106 (SE=.219), I^2=73.05%, *p*=.016]. Pooled case-control subgroup effects could not be computed for other voice diagnoses due to insufficient studies. Roy et al. (1997), who compared individuals with functional diagnoses to medical controls (outpatients with conditions other than voice disorders), could be considered an influential outlier within the estimate of pooled effect, although there was no indication of publication bias according to funnel plot inspection and Egger (*p*=.110) and Begg (*p*=.260) tests.

Diagnostic Comparison

Three studies assessed health anxiety across voice diagnoses. There were insufficient studies to examine functional and organic group differences meta-analytically. Baker et al. (2014) was the only reviewed study which compared health anxiety between functional and organic groups, reporting no differences in self-reported affirmation of illness (an approximation of health anxiety, capturing some aspects of health anxiety presentation; Prior & Bond, 2010). Similarly, studies examining health anxiety in groups with contact granuloma and mixed (predominantly organic) voice disorders (Kiese-Himmel et al., 1998; Kiese-Himmel & Kruse, 1994) reported no significant differences in health anxiety symptomatology between groups.

Neuroticism Traits

Case-Control Comparison

Eight studies compared neuroticism traits between groups with and without voice disorders, with five submitted to meta-analysis (k=6). No significant pooled difference between case-control groups was observed [0.377, 95%CI -0.002-0.757, *p*=.052; τ^2=.174 (SE=.142), I^2=81.91%, *p*<.001]. Subgroup analyses were not computed due to the number of studies available. There was no indication of publication bias according to funnel plot inspection and associated tests (Egger-*p*=.272; Begg-*p*=.716).

Three studies were analysed descriptively. Roy et al. (2000b, 2000a) reported significantly more neuroticism in functional groups than controls but did not report similar differences between controls and organic voice disorder groups. Deary et al. (1997) observed a significant difference in neuroticism between functional participants and (general practice) controls, but only in female, not male, cases.

Diagnostic Comparison

Six studies compared neuroticism traits between voice disorder diagnoses, all of which were analysed descriptively. Four studies compared neuroticism between functional and organic groups, with two (Roy et al., 2000b, 2000a) reporting significantly heightened neuroticism traits in functional groups versus those with neuromuscular (organic) voice disorders (spasmodic dysphonia, unilateral vocal fold paralysis), but two (Millar et al., 1999; White et al., 1997) reporting no significant differences in neuroticism between functional and structural (organic) diagnoses. It is possible therefore that neuroticism traits are more comparable in those with functional and structural conditions, than those with functional and neuromuscular conditions, although this comparison should be investigated further before being considered representative. Analysis of differences between organic groups (Kiese-Himmel et al., 1998; Kiese-Himmel & Kruse, 1994; Roy et al., 2000b, 2000a) showed no significant differences in self-reported neuroticism traits (Table 2).

Introversion-Extraversion Traits

Case-Control Comparison

Nine studies compared introversion-extraversion traits between groups with and without voice disorders, six of which were meta-analysed (k=7). No significant meta-analytic evidence of differences in introversion-extraversion was found [-0.386, 95%CI -1.069-0.297, p=.268]. Subgroup analyses were not computed due to the small number of studies

available. As reflected in Figure 2, the pooled effect may not be a reliable estimate as Willinger and Aschauer (2005) is skewing the estimate considerably (-2.30, smaller effect sizes in other comparisons). The high rate of study heterogeneity is a consideration [τ^2=.794 (SE=.490), I^2=95.35%, p<.001]. There was no indication of publication bias according to funnel plot inspection and Egger (p=.474) and Begg (p=.136) tests.

A similar pattern of mixed results was observed in the three meta-analytically ineligible studies comparing groups with and without voice disorders. Deary et al. (1997) reported significantly more extraversion in women, but not men, with functional voice disorders in comparison to medical (ear-nose-throat) controls. Roy et al. (2000b) reported significantly lower extraversion traits than controls in case groups with functional dysphonia and unilateral vocal fold paralysis. In contrast, no significant differences between case-control groups in introversion-extraversion were found in the other study by Roy et al. (2000a) who compared functional and organic case groups to controls.

Diagnostic Comparison

Seven studies made comparisons between voice disorder diagnoses, all of which were narratively synthesised. The pattern of results was mixed, with Roy et al. (2000b, 2000a) reporting significantly higher extraversion in organic (vocal nodule) groups than functional groups, but Millar et al. (1999) and White et al. (1997) evidencing no significant differences between functional and organic (predominantly structural) groups in introversion-extraversion. Examining organic group differences, Roy et al. (2000b, 2000a) reported greater extraversion in vocal nodule groups than other organic groups (Table 2). However, no significant organic group differences in introversion-extraversion were reported in the other narratively synthesised studies (Kiese-Himmel et al., 1998; Kiese-Himmel & Kruse, 1994; McHugh-Munier et al., 1997).

Other Relevant Characteristics

From a mood perspective, four studies (Günther et al., 1996; Kiese-Himmel & Kruse, 1994; Roy et al., 1997; van Mersbergen et al., 2008) reported significant group differences in constructs similar to social anxiety, suggesting individuals with voice disorders might experience worries related to social interaction or performance. Reviewed studies of alexithymia and emotional expressivity (Baker et al., 2013, 2014; Deary et al., 1997) found that individuals with functional voice disorders reported significantly more difficulties identifying, describing, and expressing emotions. Such difficulties are sometimes a feature of depression and anxiety (Hendryx et al., 1991), and thus may reflect group differences in mood symptoms reported above. There was also preliminary evidence that individuals with voice disorders experience more premorbid difficult life events (Baker et al., 2013; Gundel et al., 2007; Goldman et al., 1996; McHugh-Munier et al., 1997), conflict over speaking out (Baker et al., 2013), and attachment difficulties (Baker et al., 2013) in comparison to controls, perhaps precipitating mood difficulties.

From a personality perspective, beyond neuroticism and introversion-extraversion, reviewed studies investigated individual differences in traits related to the Roy and Bless (2000) conceptualisation of voice disorders, such as reward sensitivity and sensation-seeking (Mattei et al., 2017; McHugh-Munier et al., 1997; Vila-Rovira et al., 2021; Willinger & Aschauer, 2005), inhibitory control and constraint (Kiese-Himmel et al., 1998; Kiese-Himmel & Kruse, 1994; Roy et al., 2000a; van Mersbergen et al., 2008), openness to experience (Amir et al., 2023) and temperament (Andrea et al., 2018; Mattei et al., 2017). Like other personality findings presented in this review, results across personality dimensions were mixed, with some inferring different personality profiles across diagnostic groups (Mattei et al., 2017; Roy et al., 2000a; Seifert & Kollbrunner, 2006), but

others reporting no discernible pattern of case-control and diagnostic differences (see Table 2).

Sociodemographic Factors Associated with Psychological Characteristics

There is an established association between gender, age, and voice disorder development and thus age and gender were included as comparability criteria within NOS (Table 3). Regarding other sociodemographic factors, some occupations (e.g., teachers, performers, call-centre staff) are known to carry higher risk of voice problems, with some of the reviewed studies (Çobanoglu et al., 2021; El Uali Abeida et al., 2013; Falanga et al., 2020; Goldman et al., 1996; Maksimovic et al., 2020; Mattei et al., 2017; Siupsinskiene et al., 2011; Toles et al., 2021) reporting greater prevalence of these occupations within case-samples as well as potential associations between voice-risk occupations and depression and anxiety symptoms (Maksimovic et al., 2020; Siupsinskiene et al., 2011). Maksimovic et al. (2020) reported associations between smoking and edema and so some studies accounted for smoking/alcohol use by matching across groups (Baker et al., 2014; Ban et al., 2007; Cheung et al., 2009; El Uali Abeida et al., 2013; Falanga et al., 2020). Some of the reviewed studies also acknowledged lifestyle impacts, with greater rates of unemployment (Baker et al., 2013; Kiese-Himmel & Kruse, 1994; Maksimovic et al., 2020), lower educational attainment (Baker et al., 2013), higher rates of sick leave (Cheung et al., 2009), and greater rates of medication use/interventions and physical health comorbidities (Cannito, 1991; Montgomery et al., 2016; Willinger & Aschauer, 2005) in case groups. Only two studies (Dietrich et al., 2008; Elam et al., 2010) commented on sample ethnicity but did not infer any associations with voice symptoms or psychological characteristics.

Discussion

This systematic and meta-analytic review of 43 studies compared psychological characteristics across groups with and without voice disorders. It found consistent evidence of differences between case-control groups, with those with voice disorders reporting significantly more pronounced symptoms of depression and state/health anxiety, with differences in trait anxiety also observed. In contrast to this marked difference in psychological characteristics between those with and without voice disorders, inconsistent evidence of psychological differences across voice disorder groups was found, with trait anxiety as the only reviewed dimension with significant pooled differences between functional and organic groups. While the implication is that those with functional voice disorders experience more persistent and pervasive feelings of anxiety than those with organic voice disorders, it is important to note that the observed pooled difference between the two groups was only marginally significant.

Together, review findings suggest that experiencing a voice disorder is associated psychological features likely to impact psychological functioning, irrespective of type of voice diagnosis. Having a voice disorder may incur feelings of depression and anxiety which, underscored by trait and life experiences, may lead to heightened psychological distress and affected wellbeing. The findings are in keeping with recent updates to chronic pain classification (Nicholas et al., 2019), describing pain as a biopsychosocial experience inherently associated with a psychological response, and thus ‘functional’, ‘psychogenic’, and ‘organic’ designations of pain and illness may not meaningful. For voice disorders, this encourages a movement towards transdiagnostic psychological conceptualisations of clinical voice problems (see Figure 3), emphasising the contribution of psychological characteristics to the development and maintenance of voice disorders, without necessarily making distinctions between functional and organic diagnoses.

Figure 3. *Hypothesised psychological framework of voice disorders.*



Hypothesised Psychological Framework

Review findings are integrated within a psychological conceptualisation of voice disorders (Figure 3). It outlines the psychological characteristics associated with experiencing a voice disorder, bringing the findings of this review together with existing psychological characterisations of voice problems (Baker et al., 2021; Butcher et al., 2007; Deary & Miller, 2011; Miller et al., 2014; Roy & Bless, 2000). The framework draws elements from cognitive-behavioural and personality-informed conceptualisations of voice disorders, illustrating the ways in which mood and personality characteristics might interact to produce transdiagnostic voice-related psychological distress. The framework might

therefore be useful to clinicians, researchers, and patients wishing to map-out their psychological experiences of voice problems. Of course, while this review has presented consistent evidence of psychological differences between case-control groups, it is not possible to infer causality based on these findings. Thus, the framework only hypothesises potential associations between voice disorders and psychological characteristics.

Clinical Implications

Findings suggest marked psychological needs within this patient population which could be identified via screening during voice clinic practice. Screening might support clinicians and patients with recognising the role of psychological factors in voice problems, supporting case formulation and the identification of treatment needs.

It is recommended that clinical psychologists are embedded within voice specialist teams, to either provide case consultation or work with patients directly. Proponents advocate for psychologists in building the psychological skills of voice professionals (e.g., Butcher et al., 2012; Kollbrunner & Seifert, 2017) with some evidence of improved voice treatment outcomes following CBT-informed voice therapy (Daniilidou et al., 2007; Deary et al., 2018; Gray et al., 2021). In terms of direct therapeutic input, psychological therapy may be beneficial in some cases (Baker et al., 2021) and it would be interesting to investigate the utility of third-wave CBT approaches, such as acceptance and commitment therapy (ACT) and compassion-focused therapy (CFT), as these have demonstrated effectiveness in other areas of physical health (e.g., Austin et al., 2020; Dindo et al., 2017; Feliu-Soler et al., 2018; Gooding et al., 2020) and map well onto the voice disorder conceptualisation provided in Figure 3. For example, ACT has been used with people who stutter to help encourage psychological flexibility and self-efficacy when experiencing difficulties with communication, and it is reasonable to imagine how similar principles might apply to people experiencing voice symptoms. Similarly, CFT focuses on the interplay between

threat, drive, and soothe systems which might capture interactions between anxiety, depression, novelty/reward sensitivity, inhibitory control/restraint, neuroticism, and introversion-extraversion, put forward by the presented framework. The development of voice-specialist psychoeducation and self-guided psychosocial interventions may also be beneficial given potential issues accessing psychological therapy for this patient population.

Limitations of Included Studies

Sociodemographic Factors

Research on voice disorder prevalence underlines gender and age as risk factors (e.g., Bhattacharyya, 2014; Lyberg-Åhlander et al., 2019; Roy et al., 2005). Despite this, only twenty-nine of the reviewed studies controlled for gender (most by recruiting female-only samples) and only eighteen controlled for age within their group comparisons, potentially restricting the robustness of observed group effects. Furthermore, it is important to consider how uncontrolled group differences in age and gender might interact with group differences in the reviewed psychological characteristics, given that both are also associated with depression, anxiety, and personality (McCrae et al., 1999; Riecher-Rössler, 2017; Solmi et al., 2022; Weisberg et al., 2011). This means that accounting for interactions between voice diagnosis, age/gender, and psychological variables, could be important for future research making inferences about voice group differences in psychological characteristics.

Control Type

It is a strength that most reviewed studies ensured control groups had no history of voice disorders. However, studies differed in control group type, with mixed use of community controls and hospital controls, potentially restricting comparability of case-control effects

across studies. Those that recruited hospital controls argue that doing so reduced confounding effects of other psychosocial variables, such as help-seeking and somatisation (Deary et al., 1997; Millar et al., 1999), although the quality appraisal tool (NOS) used here privileges studies with community, rather than hospital, control samples. Like Deary et al. (1997), it may therefore be helpful for future voice research to recruit both community and hospital control samples to help delineate differences in psychological characteristics across control types.

Diagnosis and Classification

This review has followed voice disorder classification systems which make distinctions between functional and organic diagnoses, grouping psychogenic voice disorders and muscle tension dysphonia as functional disorders, and structural, inflammatory, and neuromuscular voice problems as organic disorders. However, it is reasonable to question how meaningful it is to classify voice disorders in this way, with ongoing debate about how to define symptoms in cases where there is overlap between functional and organic presentations and/or voice issues in the context of upper airway issues, such as chronic cough or paradoxical vocal fold movement (Baker et al., 2021; Payten et al., 2022). The debate of how to define and classify voice disorders has implications for the present review, in that many of the reviewed studies employed different ways of assessing and inferring voice diagnoses, potentially affecting study comparability and the validity of pooled effect estimates of psychological differences.

Psychological Measurement

There is likely phenomenological overlap between the reviewed psychological characteristics. While the reviewed studies have made distinctions between constructs, it is possible that there is overlap in their presentation (e.g., emotion dysregulation; Yoon et al.,

2013) and underlying processes (e.g., rumination; Roelofs et al., 2008). Therefore, it might be important for future research to take a continuum perspective, examining transdiagnostic psychological features to see whether similar patterns of group difference emerge. Furthermore, there were differences in how reviewed studies defined and measured psychological characteristics. For example, a range of mood and anxiety measures were used, using specific subscales as well as indices analogous to these, like 'negative/positive emotionality', 'affirmation of illness', and 'psychasthenia'. Heterogeneity in psychometric conceptualisation and measurement should therefore be considered when interpreting the strength and reliability of presented findings. Similarly, some studies employed personality-oriented, rather than clinically-oriented, measures of psychopathology (e.g., hypochondriasis subscale of the Minnesota Multiphasic Personality Inventory, positioned as less representative of clinical conceptualisations of health anxiety; Salkovskis et al., 2002), potentially restricting the clinical representativeness of the presented findings. Future studies should account for these measurement considerations when evaluating psychological features of voice disorders.

Sample Size

Required sample size estimates for future studies were calculated (using G*Power) based on the largest effect size observed (d=.57). At 90% power, 132 participants (66 per group) would be required to observe case-control differences of this magnitude. This indicates that some of the studies reviewed are potentially underpowered, restricting the quality of psychological differences between case-control groups. Future studies should consider these sample size estimates when investigating differences in psychological characteristics between those with and without voice disorders.

Limitations of Review

There are some conceptual and methodological limitations which potentially restrict the usefulness of the presented findings. First, over-arching psychological constructs, such as control and coping, were not analysed but are thought to contribute to psychological wellbeing in voice disorders (e.g., Epstein et al., 2009; Misono et al., 2016; Nguyen-Feng et al., 2021; Ramachandran et al., 2022). It will therefore be important for future investigations to account for intersections between over-arching constructs and the reviewed psychological characteristics. Second, as outlined above, debates in voice disorder classification mean that groupings offered in the meta-analysis may not be fully appropriate or representative of all voice classification systems, potentially reducing the clinical utility of the presented findings. Third, meta-analytic comparisons had high heterogeneity, restricting the validity and reliability of observed effects as well as highlighting the need for more consistent classification and measurement of psychological characteristics. Fourth, NOS was used to infer relative study quality, but the modifications made to items, as well as the suitability of some criteria (e.g., non-respondents), potentially impacts the appropriateness of the provided ratings. Fifth, the search generated an extremely high number of hits, raising the possibility that relevant studies could have been missed during screening. This was an issue of search-term frequency (term 'voice' generated hits associated with psychosis), and therefore steps were taken (second-reviewer, re-running search, and manual searching) to mitigate risk of screening errors. The high number of search hits also impacted the reliability and interpretation of formal agreement estimates (κ=0.73) for title-abstract screening (McHugh, 2012), so percentage agreement was used alongside κ to demonstrate appropriateness. Finally, it was beyond review scope to examine relationships between psychological characteristics and voice symptomatology dimensionally. Therefore, future research should collect meta-analytic evidence of

correlations between voice symptom severity and psychological characteristics, with the aim of identifying whether more pronounced voice symptoms are associated with greater psychological distress.

Conclusion

This review has demonstrated the psychological impact of voice disorders. It has compared groups with and without voice disorders, finding consistent evidence of case-control differences, but no reliable pattern of difference between voice disorder groups. Critical evaluation of studies identified issues of conceptualisation and classification, with considerations related to statistical power and heterogeneity of reviewed studies. A psychological framework has been offered, drawing findings together to demonstrate the psychological features associated with having a voice disorder, irrespective of voice diagnosis type. Together, the findings advocate for the role of clinical psychology in identifying, formulating, and addressing psychological factors in voice disorders.

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PAPER TWO: SERVICE IMPROVEMENT PROJECT

FORENSIC MENTAL HEALTH STAFF UNDERSTANDING AND EXPERIENCE OF PERSONALITY DISORDER: A SERVICE IMPROVEMENT PROJECT

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Abstract

There is increasing evidence for the prevalence of personality-related difficulties within the forensic mental health service user population. Services therefore need to feel able to provide meaningful and supportive care to those presenting with personality difficulties and personality disorder diagnoses. Current guidelines suggest that categorical approaches to personality, which are increasingly outdated in inferring fundamental differences between those with and without personality diagnoses, continue to dominate forensic mental health service practice, with concerns about implications for service user care and wellbeing. This service improvement project follows the Plan-Do-Study-Act (PDSA) cycle to provide recommendations for service improvement, using a questionnaire and a focus group to explore staff understanding and experience of caring for people with personality disorder diagnoses within the service. Findings identified that respondents feel that those with a personality disorder diagnosis might experience adverse service outcomes, potentially linked to lack of staff understanding or limited training. Recommendations for service improvement focused on theoretical familiarity, access to training, trauma-informed initiatives, psychological workforce representation, outcome data review, protocol updates, and reflective practice opportunities. Recommendations were shared with the service to inform future PDSA cycles and plans for service improvement.

Key words: *personality disorder; forensic; service improvement; QI; survey*

Introduction

Personality disorder (PD) is a diagnostic term used to describe enduring and pervasive difficulties with understanding and regulating relationships with self and others (d'Huart et al., 2023). There are five types of PD according to current diagnostic criteria (following DSM-V classification), covering difficulties with interpersonal relationships, thoughts about self/others, emotionality, and impulsivity and inhibition (Krueger & Hobbs, 2020). Prevalence estimates suggest that 12.16% of individuals within the general population meet the diagnostic criteria for one or more PDs (Volkert et al., 2018). Prevalence estimates are much higher in prison and forensic mental health populations (>50%; NHS England & National Offender Management Service, 2015).

There are two main approaches to how PDs are conceptualised theoretically. The first, the categorical approach, infers that those with a PD diagnosis represent a clinically distinct group defined by fundamental abnormalities in personality functioning. In contrast, the dimensional approach proposes that all personality traits lie on a spectrum and thus an individual's personality is not by its very nature 'disordered' (Krueger & Hobbs, 2020). Critics of the categorical approach argue that it lacks validity and leads to unhelpful labels which perpetuate structural inequalities and violence, bias clinical judgement, and reinforce mental health stigma (Bornstein & Natoli, 2019). In contrast, the dimensional approach is seen as more inclusive and better able to capture how certain personality traits may be (mal)adaptive across sociocultural contexts (Widiger & Trull, 2007). Indeed, each iteration of PD diagnostic criteria includes more of a dimensional focus and many scientist-practitioners now choose to use dimensional models of personality, such as the Alternative Model of Personality Disorders (Krueger & Hobbs, 2020) and the Hierarchical Taxonomy of Psychopathology (Kotov et al., 2017), when formulating personality-related difficulties.

National Context

In their position paper on *Psychological Approaches to Personality Disorder in Forensic Mental Health Settings*, Russell (2016, pg. 4-6) states:

> *"It is important to understand personality disorders in forensic settings…personality disorder has implications for risk assessment, treatment and management…in practice, individuals rarely fit neatly into the diagnostic categories and often meet criteria spanning different categories…two patients with a personality disorder may require markedly different approaches…because the group of offenders with personality disorders are widely heterogeneous."*

This quote underlines the nature of categorical approaches to PD within forensic mental health settings, captured also in national reports by Psychological Society Faculty for Forensic Clinical Psychology (O'Rourke et al., 2009) and the National Offender Management Service (NHS England & National Offender Management Service, 2015). Categorical approaches attempting to draw clear distinctions between those with and without diagnoses often dictate how services operate (e.g., service model with reliance on diagnosis; Russell, 2016), bringing in issues related to comorbidity and heterogeneity. In response, as covered in the cited reports, there is increasing recognition at a national level that a greater understanding of how staff and service users experience PDs, and their categorical and dimensional conceptualisation, is needed. The suggestion is that services should reflect on perspectives regarding PD, and how associated categorical practices might contribute to staff and service user experience of care within forensic mental health settings.

Service Improvement Context – Thames Valley Forensic Mental Health Service

Thames Valley Forensic Mental Health Service provide care in conditions of medium and low security, as well as community services, to men and women across Oxfordshire, Buckinghamshire, and Berkshire. The Littlemore site, where the service improvement project was hosted, comprises two medium and two low secure male units, a secure women's unit, and an open pre-discharge facility.

The service feels more can be done to understand how staff currently understand and experience providing care to people with PD diagnoses. The service is committed to trauma-informed practice and is running a series of initiatives designed to understand sources of structural inequality and violence within practice. The service sees understanding more about experiences of PD as part of this work.

Within the service, PD diagnoses are said to often be used to characterise those who are seen as most difficult or complex. The service wonders whether PD as a term might sometimes be used pejoratively or in a reductionist way that minimises the traumatic nature of someone's experience (Jones et al., 2021). Furthermore, the association between PD diagnoses and what is often defined as 'challenging behaviour' (Beryl & Völlm, 2018) means that, for the service, PD diagnoses might impact decision-making about treatment suitability, length of stay, and risk judgements (e.g., Mann & Lewis, 2018). The service notes a relative dominance of a categorical approaches to PDs, drawing clear distinctions between those with and without PD, in-turn impacting service practice as well as staff attitudes and perspectives. As reflected at the national level, the service relies on unambiguous clinical judgements and classification and thus has understandably found it difficult to integrate a dimensional approach that emphasises nuance and spectrums of understanding regarding PD (O'Rourke et al., 2009).

The service identified that they have not recently had the opportunity to formally characterise staff understanding and experience of caring for people with PD diagnoses and are motivated to increase awareness of how staff perspectives intersect with service practice.

Aims

The service improvement project aimed to explore staff understanding and experience of PD diagnoses in the context of the care they currently provide within the Thames Valley Forensic Mental Health Service. This was with the aim identifying opportunities for service and practice improvement. It set-out the following objectives, informed by the Plan-Do-Study-Act (PDSA) cycle:

1. Explore and characterise how staff currently understand and experience PD, in the context of the service and care they provide, using a questionnaire.
2. Study service user and staff responses to questionnaire findings via focus group.
3. Use outcomes from the above objectives to identify opportunities for, and make recommendations towards, service improvement.

Method

The service improvement project was completed within the Inpatient Service (Littlemore Site) of the Thames Valley Forensic Mental Health Service. It was first introduced and approved at a service Clinical Governance meeting and then developed and approved in partnership with the Oxford Healthcare Improvement Centre. As a service improvement project focused on staff routine practice, no formal ethical approval via ethics committee was required.

Plan-Do-Study-Act

Plan-Do-Study-Act (PDSA) is an established service improvement framework regularly used to improve the quality of healthcare delivery (M. J. Taylor et al., 2014). Following a cycle of iterative development (Leis & Shojania, 2017), PDSA sets out four steps of learning (plan, do, study, act) designed to help users identify sources of change and take actions towards positive service development and improvement. 'Plan' (P) refers to the first step of the cycle, in which the potential for service change is identified. The 'do' (D) step tests out the plan for change and its scope. The next step 'study' (S) examines responses to the idea of change and/or the change itself. 'Act' (A) is the final step in which adaptations and recommendations for change are developed, informing the creation of a new PDSA cycle (M. J. Taylor et al., 2014).

Consultation with Oxford Health Quality Improvement team identified PDSA as an appropriate improvement framework for this service improvement project. It was decided that the project would follow the PDSA cycle as per below.

Project Development (P)

The scope and plan of the service improvement project was developed following discussions with the service lead psychologist. As per the section on service context above, service improvement needs related to staff understanding of and experience working with people with PD diagnoses were identified. Consultations with service users echoed this, suggesting ways in which service practice could be improved. As the final part of the project development step (P), discussions were facilitated with the quality improvement team, and the patient care experience and involvement lead for the service, to agree how the next steps of the cycle would be coordinated. A plan for change was agreed, comprising questionnaire development, delivery, and analysis (D), focus group facilitation

(S), and recommendations for service improvement (A), with the aim of supporting the service with its aim of improving practice related to caring for people with PD diagnoses.

Questionnaire (D)

A questionnaire was created with the purpose of characterising and quantifying staff understanding and experience of working with PD. Following consultation with stakeholders and discussion of themes raised during step P, it was agreed that the questionnaire would: a) survey staff theoretical understanding of personality constructs, b) characterise staff perspectives towards care currently provided to service users, c) explore perceived effectiveness and appropriateness of existing and previous staff training on the topic, d) estimate relevance of and desire for service improvement.

The questionnaire (see Appendix E) was developed based on the item generation process documented in Bowers and Allen (2006). Items were created using background literature and refined and agreed to via a consultation process with clinicians with topic expertise and service users with lived experience. It comprised 30 items and took approximately 10 minutes to complete.

Seventeen staff working within the service (approximately 6.25% of eligible staff pool) were recruited via opportunity sampling to complete the questionnaire. All responses were collected anonymously, and participation was fully optional. The decision was made to not collect any potentially identifiable information (e.g., job role, age, gender) to preserve anonymity. All staff were encouraged to respond accurately and honestly.

Focus Group (S)

Questionnaire outcomes were presented and discussed in a focus group (steering questions, Appendix G) comprising service users (n=7) and staff (n=11) for 20 minutes. The aim of this was to review questionnaire findings, share responses and reflections, and gather

consensus on understanding and experience of PDs. As per the PDSA cycle, the purpose of this step was to study responses and thereby inform recommendations (A) for service improvement.

Recommendations (A)

Recommendations were developed collaboratively between stakeholders following the preceding PDSA steps. Recommendations were first shared informally via email and meeting-based discussion, and then via written report submitted to the service. As per PDSA, recommendations for service improvement focused on positive action, making suggestions for how service practice might be updated and improved.

Results

Findings from the questionnaire and focus group are presented below. Seventeen respondents provided questionnaire responses for analysis, with 18 respondents participating in the focus group. No formal inferential or thematic analyses were computed due to the small amount of data available, with the service preferring to receive descriptive summaries of outcomes. All findings informed the service improvement recommendations shared with the service (see Table 4).

Questionnaire Outcomes

Close to all staff who responded to the questionnaire (88.24%) said they are currently working with service users with PD diagnoses, with one respondent saying they do not work with those with PDs and the other responding they are unsure. Of these, 23.53% said they assess and/or diagnose PD as part of their role, with most respondents (70.59%) involved in risk assessments and care management plans which consider the role of personality factors.

Staff Theoretical Understanding

Respondents demonstrated an accurate understanding of current definitions of PD. When asked to provide a brief written definition of PD, all respondents referenced a constellation of traits related to emotional and relational regulation. Most respondents mentioned traumatic histories and/or the development of behavioural strategies designed to keep safe which may have maladaptive consequences. Some respondents referenced the 'three P's' framework for understanding PDs, namely that PDs are defined by personality traits considered problematic, pervasive, and persistent. Despite relatively accurate understanding of PD definition, respondents on average rated their confidence in their provided definition as moderate (54.11%).

Respondents expressed relatively low familiarity with categorical and dimensional approaches to PD conceptualisation, with mildly more familiarity with categorical (mean familiarity rating 4.94/10) than dimensional (mean familiarity rating 4.25/10).

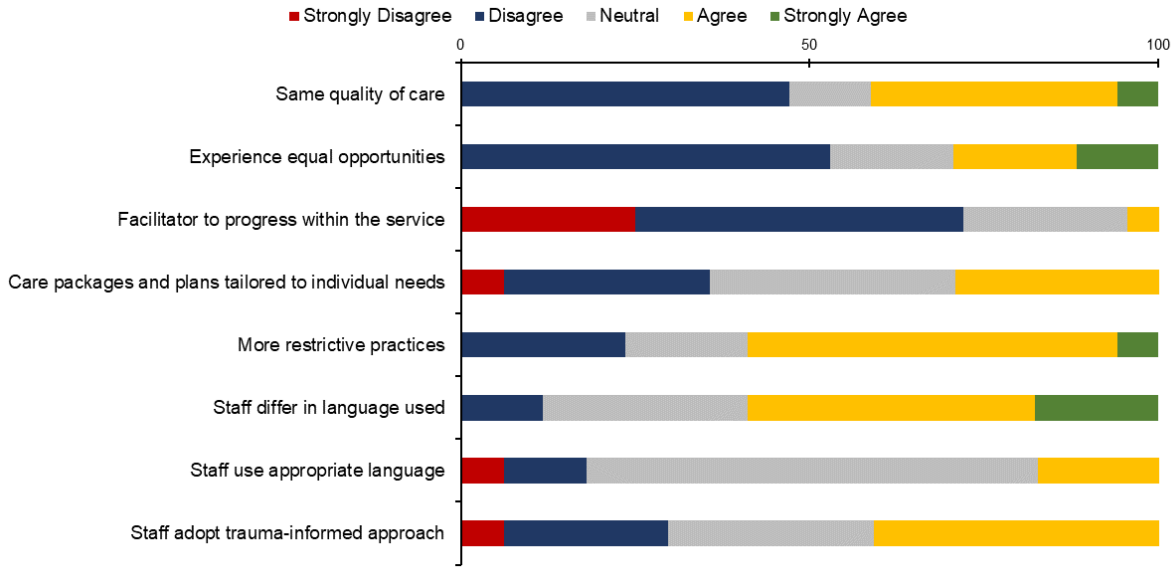
The frequency with which staff reported speaking to service users about PD was mixed, with 41.17%, 47.06%, and 11.76% responding 'rarely', 'sometimes', and 'often' respectively.

Staff Perspectives

Respondents rated their agreement with a series of statements about care provided to people with PDs within the service (Figure 4). As shown, it is possible that people with PD diagnoses do not experience the same quality of care and equal opportunities compared to people without PDs within the service. It was identified that PD diagnoses are not seen by respondents as a facilitator to progress within the service. As shown, there was relative consensus that people with PDs experience more restrictive practices (seclusion, restraint, enforced medication), with mixed views about whether they receive care packages and

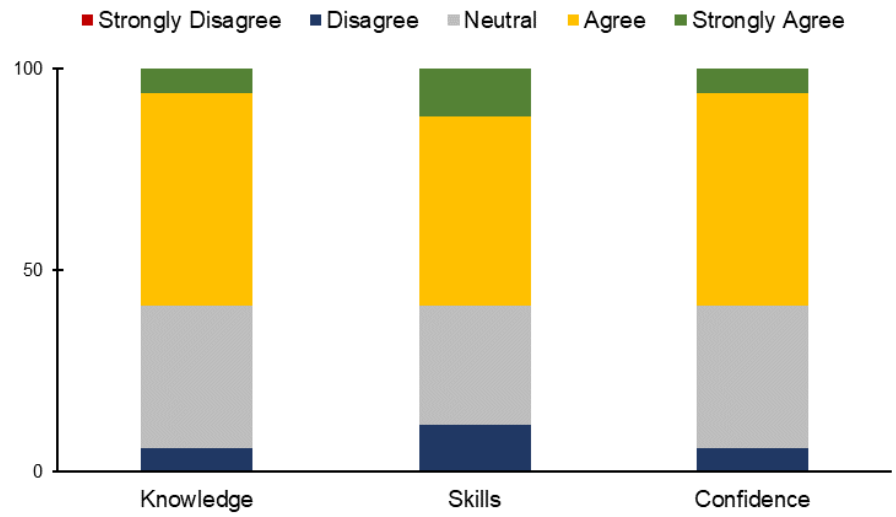
plans which are tailored to individual needs. 41.18% of respondents indicated that they agree that a trauma-informed approach to care is offered within the service.

Figure 4. *Percentage agreement to statements about care currently offered to individuals with PDs within the service.*



Staff were asked to rate their knowledge, skills, and confidence regarding providing care to people with PDs within the service (Figure 5). As shown, respondents were generally positive about their role performance, expressing relative agreement about their knowledge, skills, and confidence.

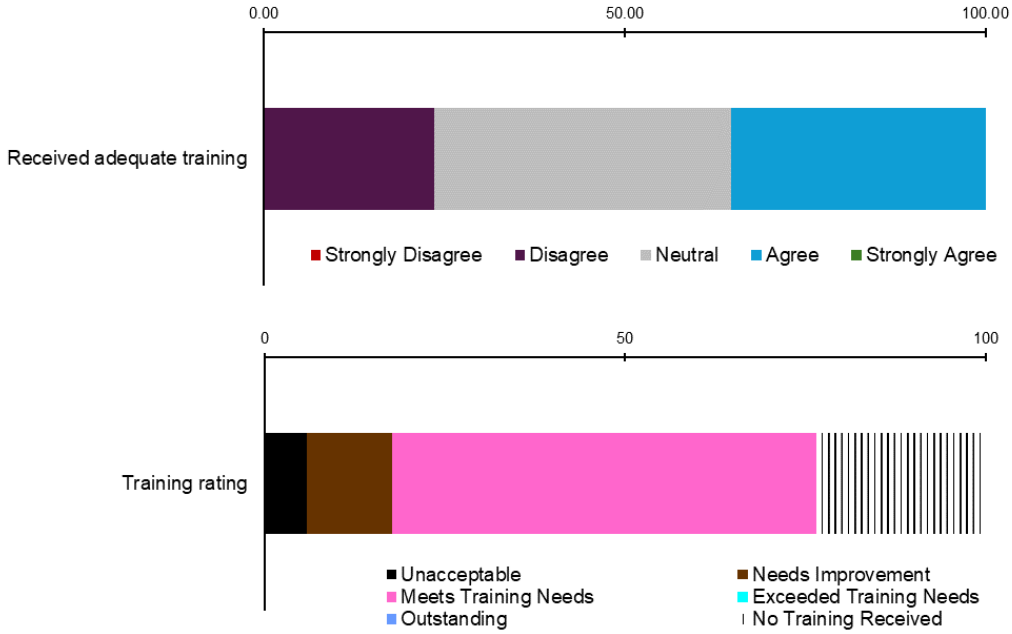
Figure 5. *Percentage agreement to statements about having the necessary knowledge, skills, and confidence regarding PD to perform staff role effectively and appropriately.*



Existing Training

Respondent consensus was mixed regarding whether adequate and appropriate training has been received regarding supporting people with PD diagnoses within the service (Figure 6). When asked to rate the quality of training received (unacceptable, needs improvement, meets training needs, exceeds training needs, outstanding, no training received), 58.82% said training met training needs, with 17.64% suggesting that training needs improvement. A considerable portion (23.53%) of respondents explained that they have not received any training regarding PDs. It is therefore possible that lack of training influences the other staff responses presented here.

Figure 6. *Percentage agreement about whether existing training available regarding supporting people with PD diagnoses is adequate and appropriate, identifying whether training met expectations and training needs.*



Service Improvement

The final part of the questionnaire asked staff to make suggestions for service improvement. The suggestions informed subsequent recommendations for service improvement (see Table 4). Responses indicated that there is considerable desire for service improvement, with all respondents making suggestions for how service practice could be improved when supporting people with PDs.

Excerpts of suggestions for service improvement are presented in the appendices (Appendix F). Responses can be summarised with two principal topics, namely training/education and therapeutic environment. As reflected in the service improvement recommendations presented in Table 4, respondents indicated that training, with an embedded lived experience component, would help increase understanding and awareness of care experiences, perhaps facilitating changes in staff language and care experiences as identified in Figure 4. The topic of therapeutic environment captures ongoing support for

staff teams, as well suggestions for improvements in service structure, like service user suitability for engagement in ward activities and therapeutic activities, ward composition, and accessibility of internal and external services. Specifically improving connections with community teams was identified as a recommendation for service improvement by several respondents.

Focus Group

The focus group was facilitated with the purpose of reviewing responses to the questionnaire outcomes and associated recommendations for service improvement (step S). The focus group identified that PDs are a personal topic which is difficult to talk about, with consensus that service users tend not to talk to each other about PDs. Like in the questionnaire, staff noted that they only occasionally talk with colleagues or service users about PDs. Consistent with questionnaire feedback, lack of awareness or knowledge about PDs and potential for stigma were volunteered as reasons why respondents might not talk about PDs.

Like the questionnaire responses, staff and service users said they were less familiar with dimensional approaches than categorical approaches. It was suggested by both service users and staff that categorical approaches are helpful because they identify those that might have the most care needs, meaning that appropriate care decisions can be made and provided, which they felt might be missed by a dimensional approach. Moreover, staff noted that taking a dimensional approach might help with understanding a spectrum of severity, rather than describing symptoms as present or absent, although service users expressed feelings of confusion around this. Recommendations around increasing understanding about PDs were therefore seen as appropriate by attendees.

Attendees recognised that it is important for care for people with PDs to be stable, compassionate, and calm. Like the questionnaire, the work the service has done to integrate trauma-informed approaches was noted by focus group attendees.

Attendee suggestions for service improvement mirrored those cited in the questionnaire. More staff training on PDs which centres lived experience was recommended, particularly given staff turnover and frequency of use of bank staff. It was suggested that training be embedded into induction with psychoeducational resources about PD made available on the intranet.

Discussion

This service improvement project was developed with the Thames Valley Forensic Mental Health Service. It explored how service staff understand and experience PD in the context of the care they provide, with the aim of identifying and recommending opportunities for service improvement. It followed a PDSA cycle; an established quality improvement framework with demonstrated effectiveness and usefulness within healthcare settings (Leis & Shojania, 2017; M. J. Taylor et al., 2014).

The service identified a need to better understand staff perspectives and experiences of caring for people with PDs. The service emphasised a need to improve the support offered to service users with PD diagnoses, thinking about potential associations between dimensional approaches, trauma-informed practice, and structural (in)equality within the service. Previous research (e.g., Mason et al., 2010; Russell, 2016; Willmot & Evershed, 2018) has outlined potential negative impacts of categorical perspectives on service practice through stigma and restrictive practice, for example.

To do so, a questionnaire was used to characterise staff understanding and experience of PD in the context of the care they provide within the service. The questionnaire was developed collaboratively between stakeholders and completed by 17 respondents. Findings indicated, as per national context and identification of service improvement needs (step P), that staff felt slightly more familiar with categorical than dimensional approaches to PD, although familiarity remained relatively low overall. Findings suggested that respondents felt that individuals with PDs experience more adverse outcomes within the service, with consensus that individuals with PD diagnoses experience more restrictive practices, and greater inequality of opportunities, compared to those without PD diagnoses within the service. The work that the service has done to increase trauma-awareness when caring for people with PD diagnoses was recognised by respondents.

Respondents rated the training they have previously received from the service regarding supporting people with PD diagnoses. All respondents provided relatively accurate definitions of current personality disorder classification, suggesting that service training is effective in helping staff define PDs. Moreover, service staff agreed that they have a good level of knowledge, skills, and confidence when working with people with PD diagnoses. Those who have previously participated in training run by the service mostly described it as a sufficient to meet training needs, with agreement regarding its adequacy and appropriateness. However, a considerable portion said they had not received any training.

The findings generated by questionnaire (step D) were discussed by a focus group (step S). The purpose of this was to reflect on the meaning of the findings, with a view to monitoring responses to ideas of service improvement as per the PDSA cycle. Outcomes were like the questionnaire, with attendees citing lack of awareness about PDs and unfamiliarity with dimensional approaches. Like the questionnaire, training and increasing awareness were identified as key recommendations for service improvement.

Taken together, the questionnaire and focus group findings therefore present a mixed picture. Staff on the whole rate themselves as having sufficient knowledge, confidence, and skills when working with people with PDs within the service, proposing that previous training run by the service has to some degree sufficiently met training needs. Despite this, based on responses, it appears that the service continues to find it difficult to best support people with PD diagnoses. For example, questionnaire respondents noted more adverse service outcomes in those with PDs in comparison to those without PD diagnoses, captured in ratings of quality of care, service progress, restrictive practice, and staff language use. Thinking about the theoretical and national context underpinning this project, it is possible, as per national reports and guidance (O'Rourke et al., 2009; Russell, 2016; Völlm et al., 2018), that these adverse outcomes link back to the disconnect between categorical practice and dimensional theory described earlier. Indeed, as identified by staff during the focus group, the forensic mental health care model is dependent on categorical approaches for service planning and delivery, inferring fundamental differences between service users with and without PDs. Perhaps then, adopting a categorical approach perpetuates divides in service care and staff perspectives between service users with and without PD diagnoses (Carroll et al., 2022) (see Table 4), perhaps incurring the outcomes identified by questionnaire respondents in step D.

Service Improvement Implications

Steps D and S gathered data and reviewed responses to the possibility of service improvement, with the aim of informing recommendations regarding understanding and experience of PD within the service (A). Before describing the service improvement implications stemming from this, it is important to consider that steps D and S may have initiated service improvements within and of themselves. Indeed, studies of service improvement within other forensic mental health services (e.g., Kernaghan & Hurst, 2023;

O'Sullivan et al., 2020) have shown that increased awareness, service user feedback, and reflection often precede service change within forensic settings (e.g., Guite, 2021; Johns & Freshwater, 2005; Lantta et al., 2021). Given that these processes were involved in the delivery of steps D and S, they may have initiated a movement towards service improvement, for example by raising awareness of PD-related care experiences.

As the final step of the PDSA cycle, the Act (A) step dictates that outcomes of previous steps (D, S) inform meaningful recommendations for service improvement (see Table 4). Recommendations were first disseminated informally via email and meetings, and then via internal report submitted to the service.

All recommendations were produced in context of NHS England guidelines (NHS, 2019; NHS England & National Offender Management Service, 2015) and guidance for the delivery of effective forensic mental health services (e.g., Royal College of Psychiatrists, 2019). Guidelines propose that training is effective if it helps to upskill healthcare workers holistically, so in this case drawing influence from multidisciplinary models of forensic care and PD support. Psychoeducation should be accessible and approachable, with availability in multiple forms such as written and visual resources. Furthermore, in line with guidance, reflective practice should be multi-system and prompt staff to practice reflexivity in private as well as with others (Health Education England, 2023). Service structure is also important and should be consistent with the recommendations made, considering support structures for staff, ward composition, and ward social climate (Puzzo et al., 2019), for example. As such, the presented recommendations follow national guidelines and, if implemented, may have the potential to improve Thames Valley Forensic Mental Health Service practice regarding supporting service users with PD diagnoses.

Table 4. *Recommendations for service improvement.*

	Recommendation	Reasoning	Example quotes from staff supporting recommendation
(1)	Increase understanding and awareness of dimensional perspectives to personality disorder.	- Staff rated their familiarity with dimensional approaches as low. - Dimensional approaches have demonstrated theoretical utility in conceptualising, measuring, and formulating personality difficulties. - Doing so might reduce stigma and splitting typically associated with categorical approach. - Doing so might increase staff confidence and frequency in talking with service users about personality and their experience of diagnosis, thereby increasing shared understanding.	*"The dominant medical model is more attached to categorical perspectives because this facilitates greater health-care organisation, but at a cost of then not treating (or marginalising/excluding) people with personality difficulties."* *"Some professionals do not recognise PD as a mental illness and look upon services users with this diagnosis as time wasters, attention seekers."*
	Act - How this could be done: • **Psychoeducation** (leaflets, videos) about how personality traits lie on a continuum, and those with personality disorders might have a more pronounced combination of traits at one or both ends of the continuum. • **Intranet resources** providing new and existing staff with a brief introduction to what PDs are, how they are assessed and conceptualised, and how to speak about PDs with colleagues and service users. • **Assessment, care plan, and case note prompts** (scripts, letter headers) which provide a brief description of what a dimensional approach is, reducing perceptions of fundamental differences between those with and without personality disorder diagnoses. **All should be coproduced with those with lived experience of PDs.**		
(2)	Improve access to training about personality disorders.	- Staff recognised need for further training. - Past training initiatives rated as meeting need, although considerable portion of cohort stated they had not received any training on the topic. - Doing so might increase staff confidence and frequency in talking with service users about personality and their experience of diagnosis, thereby increasing shared understanding.	*"Offer more training, led by users by experience."* *"Offering more training would allow staff to feel more confident and may mean patients receive more equitable care."*

		- Doing so may address findings relevant to language, for example staff differences in appropriateness and use of language.	
	Act - How this could be done: • **Knowledge and Understanding (KUF) training** is a national initiative designed to increase professionals' skills and confidence when working with traits and patterns associated with personality disorder diagnoses. Some respondents completed this training previously and recommended that the service could consider increasing access to this. • **Lived experience involvement** in training and in conversations about personality would help support staff empathy and understanding, also creating more of a collaborative effort towards service improvement in this topic area. • **Increase training offered during induction** regarding PDs. Respondents noted how staff who are new to working in the area might find it more difficult, and so induction-based training (which is then supplemented routinely) might address some of the findings presented in this report.		
(3)	Continue to develop trauma-informed initiatives.	- Respondents noted the role that trauma might play in the presentation and development of personality difficulties. - Trauma-informed initiatives have demonstrated efficacy in forensic mental health settings. - Doing so might offset some of the adverse effects associated with categorical approaches to personality disorder.	*"Some elements of the trauma-informed work are starting to help."* *"Bring a focus on trauma-informed case discussions to all units and properly evaluate them."*
	Act - How this could be done: • **Continue roll-out** of trauma-informed awareness campaigns and initiatives within service. • **Include trauma-informed** lens within case discussion sessions and case management plans. • **Operationalise initiatives** with the purpose of developing outcome measures to assess and evaluate effectiveness.		
(4)	Boost psychology representation across services.	- Personality assessment and formulation is often the responsibility of psychologists working within forensic settings. - Respondents recorded that psychological perspectives and treatments can be helpful in supporting people with PD diagnoses.	*"Services need to ensure that they have adequate staffing in psychology teams, who can provide training and supervision on this subject for the rest of the MDT."* *"Access to psychology is better than in non-forensic services."*

	Act - How this could be done: • **NHS England** plan to improve training, recruitment, and retention into psychological professions. • **Sharing of psychological skills across team members** as other professionals should (via training, reflective practice, team formulation, psychoeducation) be supported to increase confidence and competence in talking about, formulating, and responding to, personality-related difficulties.		
(5)	Outcome data review to investigate whether subjective responses correspond to actual service inequalities.	- Questionnaire responses identified that staff feel that people with PDs experience more restrictive practices, that PD diagnosis is not a facilitator to progress with the service, and (in comparison to those without PD diagnoses) experience a different quality of care and unequal opportunities.	*"I feel personality disorder patients struggle more in the service because the staff are bouncing around to tailor care to different disorders."* *"There is definitely a stigma around patients with personality disorders as many staff find their behaviour more complex to deal with ("challenging")."* *"Work with supported accommodation providers to upskill them. This may mean PD patients are not waiting as long for accommodation to be found."*
	Act - How this could be done: • **Audit** use of restrictive practices and incident reports to explore whether those with PDs are disproportionately represented in comparison to those without PD diagnoses. • **Quantitative review of access** to services to see whether PD diagnoses inform care planning/decision making regarding access and opportunity (e.g., ground leave opportunities, connection with community services, accessing recreational groups etc.), and associated facilitators and barriers within care experience. • **Audit** connections between inpatient and community services to ensure understanding of PDs is handed-over across teams, with the aim of facilitating person-centred and trauma-informed transitions between services for those with PDs.		
(6)	Update assessment, formulation, and care management planning	- Potential that categorical approaches dominate existing service models.	*"Clearer and more formal assessments of needs relating to problematic behaviours related to personality."*

	processes to allow for more dimensional thinking.	- Staff should be prompted to consider dimensional approach which is informed by MDT perspectives and lived experience of service users.	*"It needs to genuinely be MDT based, but rarely is."* *"Good ones are very specific to that patient's history and current risk, and also show a clear process whereby the patient has been involved in the process."*
	Act - How this could be done: • **Update assessment and care management protocols** to incorporate dimensional aspect (e.g., how to define, respond to, and formulate these) through question prompts and signposting to psychoeducation materials. • **Formalise how MDT members contribute to assessment** by including recognition of who has added information to assessment and care plan. • **Include section on service user experience** where feedback is given and integrated within the report, with a focus on preferred language, needs, and perceived care facilitators and barriers.		
(7)	Increase scope and accessibility of reflective practice opportunities.	- National guidance emphasises the importance of reflective practice when working in this area. - Reflective practice might support staff to become more cognizant of differences between categorical and dimensional approaches to PD, and how these in-turn influence personal and professional practice. - Respondents recognised the impact of working in this area on their personal and professional wellbeing, and reflective practice may provide a forum to do so.	*"Support for staff teams who are charged with supporting such individuals."* *"Staff need support to apply and embed the knowledge [gained from training]. Otherwise, it is forgotten."*
	Act - How this could be done: • **Increase awareness of different forms of reflective practice** (journaling, group meetings, private reflection, observation) to support staff with engaging in forms of reflective practice most meaningful to them.		

- **Embed reflective practice component in training** to support staff with retaining, processing, and embedding principles covered in training.

Methodological Considerations and Limitations

The service improvement project was developed with the Thames Valley Forensic Mental Health Service, generating recommendations for practice following the PDSA cycle. There are limitations within its design and delivery which need to be considered, however, and should be addressed by future research where possible before proceeding.

First, no identifying information was collected to preserve anonymity. While this supports the validity of questionnaire and focus group responses, lack of information about respondent characteristics makes it difficult to infer whether responses are biased by a particular profession (e.g., psychology) and associated experience and training. This limits the representativeness of the sample which, compounded by the small sample size, means findings should be interpreted carefully and may not be representative of service-wide perspectives on caring for people with PD diagnoses.

Second, it was beyond the scope of the presented project to collect audit data pertaining specifically to PD service user experience. Example audit data might have included length of stay, experience of restrictive practices, and incident frequency; all of which would have supplemented the subjective data gathered during questionnaire and focus group regarding associations between PD diagnoses and care experiences. Collecting such data would help quantify the extent to which the subjective reports here (e.g., consensus on differences in care experiences between those with and without PDs) are reflected statistically in service outcomes. Future service improvement projects on this topic should consider including audit and evaluation of these data as part of the PDSA cycle, and this has also been recommended to the service as a potential route for service improvement.

Finally, the project had embedded service user involvement throughout all steps of the PDSA cycle aside from the ‘do’ (D) step in which questionnaire responses were gathered

from staff only. Based on the presented findings, it appears that staff feel service users with and without PD diagnoses are treated differently; however, it will be important for future research to quantitatively characterise the extent to which service users feel this is their experience. Indeed, while the presented findings indicate how staff understand and experience PD in the context of the care they provide, how this translates to service user subjective care experience remains unknown based on the presented findings. Theory-driven empirical projects which test links between personality characteristics and service outcomes could also be advantageous in this regard.

Conclusion

This paper has presented a service improvement project completed within a forensic mental health service. The project was initiated with the aim of improving service practice regarding staff understanding and experience of PD, informed by literature describing debates between categorical and dimensional approaches to personality conceptualisation within forensic settings. A PDSA cycle was followed, whereby a plan for identifying need for change was implemented, using a questionnaire and focus group design to identify scope for change and associated responses. This culminated in the development of recommendations for service improvement, namely increased understanding of dimensional approaches, improved staff training, more trauma-informed initiatives, increased psychological workforce representation, outcome measurement, protocol review, and reflective practice. Recommendations were shared with the service via written report with the aim of improving service practice regarding caring for people with PD diagnoses.

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PAPER THREE: THEORY DRIVEN RESEARCH PROJECT

PSYCHOSOCIAL DISTRESS AND INTERPERSONAL INTERACTION EXPERIENCE IN FACIAL PALSY: ASSOCIATIONS WITH FACIAL EMOTIONAL MIMICRY

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Joint Working: This project included collaboration with another trainee (Chloe Hiles). The contribution to the work presented in this thesis is as follows: Luke Aldridge-Waddon, Conceptualization; Methodology; Formal Analysis, Writing – original draft, and review and editing; Project Administration – ethics application, data collection (joint with Chloe Hiles). Chloe Hiles, Project Administration – ethics application, data collection (joint with Luke Aldridge-Waddon). More information is provided in Appendix I.

Abstract

The impact of facial palsy on mood and interpersonal functioning is increasingly recognised. This research investigated differences in psychosocial distress and interpersonal interaction experience between matched groups with (n=91) and without (n=86) facial palsy, exploring associations with spontaneous facial emotional mimicry as indexed using a mimicry task. Self-report measures were used to assess psychosocial distress and interpersonal interaction experience, with facial emotional mimicry assessed via video observation task in a participant subsample (n=61). Group differences in psychosocial distress and interpersonal interaction experience were observed, with facial palsy participants reporting more pronounced self-reported symptoms of depression, anxiety, and appearance-related dissatisfaction alongside less interpersonal pleasure and excitement. No group differences in facial emotional mimicry were observed, however, with limited associations between mimicry and psychosocial distress and interpersonal interaction experience. Findings are discussed in the context of the social regulator framework and its relevance to people with facial palsy.

Key words: *facial palsy; psychosocial; mimicry; relationships; emotions*

Introduction

Facial palsy is characterised by a weakening of the facial nerve (Beurskens & Heymans, 2004). It is associated with congenital conditions, such as Moebius syndrome, and acquired conditions, like Bell's palsy (Hohman & Hadlock, 2014). Individuals with facial palsy present with a constellation of visible differences, featuring partial or complete paralysis of the affected side of the face, including drooping of the eye, eyebrow, and/or mouth. Lifetime prevalence is 1.6% (Szczepura et al., 2020), with facial therapies typically offered alongside muti-disciplinary approaches (e.g. clinical psychology, injections and/or surgery; Teresa & Jowett, 2018).

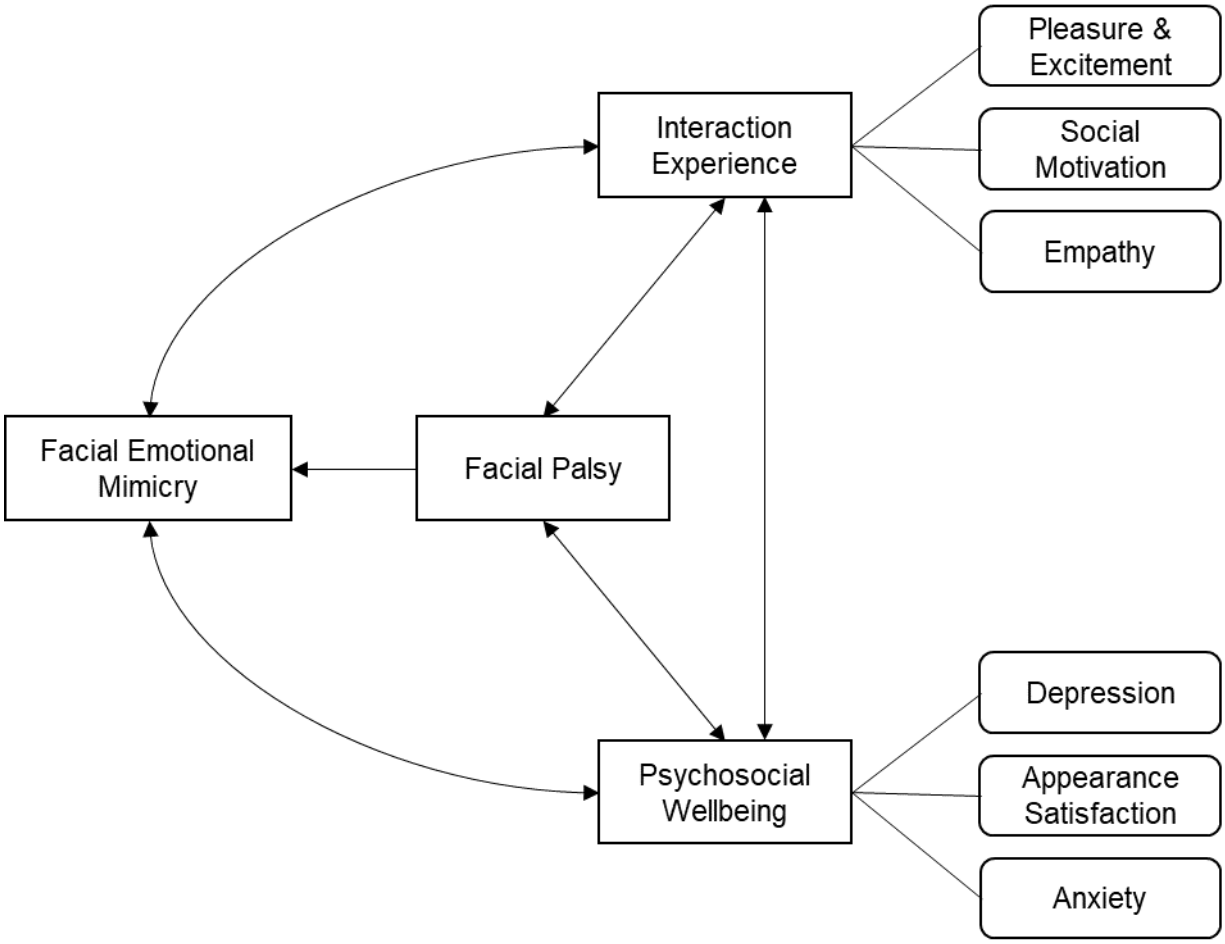
The psychosocial needs of people with facial palsy are increasingly recognised (Hotton et al., 2020; Nellis et al., 2018). Affected individuals report heightened feelings of depression, appearance-related dissatisfaction, and anxiety (Hotton et al., 2020; Pattinson et al., 2021), with adjustments in interpersonal interaction experience (such as interpersonal pleasure, social anxiety, and social motivation) also observed (Lyford-Pike & Nellis, 2021; Vargo et al., 2023). Interplay between psychosocial distress and interpersonal interaction experience in facial palsy is well-documented (e.g., Bogart et al., 2015; Hamlet et al., 2021), with mood and appearance-related difficulties influencing interpersonal behaviour (e.g., increasing social isolation), in-turn further exacerbating distress.

Conceptualisations of psychological mechanisms in facial palsy suggest that mood and interpersonal interaction experiences might be linked to adjustments in facial emotional mimicry (Hotton et al., 2020). Facial emotional mimicry is a central feature of social interaction and is defined as the imitation of others' facial emotional expressions (Hess & Fischer, 2014). It typically occurs spontaneously (Hess, 2021; Hess & Fischer, 2014) and is characterised by parallel elicitation and expression of emotional states. Models of facial

emotional mimicry, like the social regulator framework (SRF; Hess, 2021; Hess & Fischer, 2013, 2022) posit that mimicry plays a role in social and emotional development (Stel & Vonk, 2010), facilitating a series of interpersonal processes, like empathic responding (Drimalla et al., 2019), approach-avoidance (Likowski et al., 2008), and rapport and affiliation development (Chartrand & Lakin, 2013) (see Figure 7).

Potential associations between impairments in mimicry and psychological experiences in facial palsy are captured by the SRF (Figure 7). SRF acknowledges links between mimicry, interpersonal processes, and related changes in psychological distress, with models of social anhedonia (e.g., Barkus, 2021), for example, proposing associations between reduced interpersonal pleasure and heightened feelings of depression and anxiety. Therefore, as shown in Figure 7, people with facial palsy might experience impairments in facial emotional mimicry, which according to SRF, might impact interpersonal interaction experience and coincide with increased feelings of psychosocial distress (Hotton et al., 2020). Indeed, existing studies of facial emotional mimicry in congenital facial palsy resulting from Moebius syndrome (De Stefani et al., 2019) infer that reduced mimicry from birth can have implications for later psychosocial and interpersonal outcomes, although whether this applies to the wider facial palsy population and how this corresponds specifically to psychosocial distress and interpersonal interaction experience remains less well-understood. A more comprehensive understanding of links between psychosocial distress, interpersonal interaction experience, and facial emotional mimicry in facial palsy is therefore needed.

Figure 7. *Facial mimicry in facial palsy, created for this manuscript.*



The presented study seeks to meet this need, with two complementary objectives:

- Investigate differences in psychosocial distress and interpersonal interaction experience between groups with and without facial palsy.
- Explore associations between psychosocial distress, interpersonal interaction experience, and spontaneous facial emotional mimicry.

As such, it aims to investigate differences in psychosocial wellbeing between groups with and without facial palsy (H1), examining constructs (depression, anxiety, appearance-related satisfaction) which have been identified previously as prominent, highly correlated, features of psychological distress in facial palsy (e.g., Hotton et al., 2020). Then, it aims to establish whether groups demonstrate differences in interpersonal interaction experience,

informed by descriptions of social relationships in facial palsy (e.g., Lyford-Pike & Nellis, 2021; Hamlet et al., 2021) which detail the impact of reduced facial movement on interpersonal outcomes, such as pleasure and excitement (H2). As for other aspects of interaction experience featured in SRF (Figure 7), no hypotheses are formulated regarding group differences in empathy due to limited availability of studies which have investigated self-reported empathy in this population. While SRF includes social motivation (i.e. goal-directed interpersonal behaviour) as a component of mimicry-related interaction experience, social motivation might be conceptualised as a broad construct which includes interpersonal pleasure and empathy as dimensions of motivation (Elliot & Covington, 2001). Given difficulties with comprehensively assessing social motivation using self-report measures in clinical populations (Elliot & Covington, 2001; Fulford et al., 2018), this study focuses on dimensions relevant to motivation in SRF, namely pleasure/excitement and empathy, rather than social motivation more broadly. Following SRF, facial emotional mimicry is then explored as a potential underlying mechanism implicated in facial palsy, first exploring group differences in mimicry (H3) before exploring associations between mimicry, psychosocial distress, and interpersonal interaction experience (H4).

Hypotheses

H1. Individuals with facial palsy will report more pronounced symptoms of depression and anxiety, and less appearance-related satisfaction, than control participants.

H2. Individuals with facial palsy will report less positive interpersonal interaction experiences, namely reduced interpersonal pleasure and excitement, than control participants.

H3. Individuals with facial palsy will demonstrate less spontaneous facial emotional mimicry than control participants.

H4. Facial emotional mimicry will correlate with psychosocial distress and interpersonal interaction experience across groups, with greater mimicry associated with less distress and more positive interpersonal interaction experience.

Materials and Methods

Coproduction

People with facial palsy coproduced: 1) selection of self-report measures, 2) behavioural task development, 3) study materials, and 4) dissemination. Those involved in coproduction were compensated £15 per-hour.

Participants and Procedure

One hundred and seventy-seven participants with (n=91) and without (n=86) facial palsy took part (Table 5). No significant group differences in mean age or gender frequency were observed. Exclusion criteria included: (1) current use of psychotropic medication, (2) diagnosed neurodevelopmental condition, and (3) visual or hearing impairment affecting participation. Eligible participants were required to be aged 18+, English-speaking, and for those wishing to complete the behavioural task, able to access a webcam with audio-video functionality. Those with unilateral congenital and acquired facial palsy were eligible to participate, although those with bilateral facial palsy were ineligible because of software mimicry coding requirements. Criteria were assessed via self-report during enrolment. Sample size calculations using G*Power (detecting d=.50 group differences, 90% power with α=.05) estimated 172 participants (n=86 per group), recruiting slightly more participants (n=177) to account for attrition and nonresponse rates.

Table 5. *Participant characteristics.*

	Facial Palsy Group (n=91)	Control Group (n=86)
Age		
Mean	51.79	51.70
Standard Deviation	12.12	14.33
Inferential Statistics	U=3682.50, p=.498	
Gender (n, identify as)		
Female-identifying	85	74
Male-identifying	6	11
Non-Binary	0	1
Inferential Statistics	$X^2(2,177)$ =3.093, p=.213	
Ethnicity (n, identify as)		
Asian	0	1
Asian Chinese	1	2
Asian Indian	3	4
Asian Pakistani	0	1
Black African-American	1	2
Black British	1	0
Hispanic American	0	1
Mixed Other	1	1
Mixed White and Asian	0	1
Mixed White British and Asian	0	1
Mixed White British and Black Caribbean	1	0
Multiracial American	0	1
White American	21	7
White British	54	61
White British Irish	2	1
White Mixed	2	0
White Other	4	2
Education (n, highest level achieved)		
Left School Aged 14-16	9	10
Left School Aged 18	5	7
Undergraduate Qualification	48	50
Postgraduate Qualification	29	19
Diagnosis (n)		
Bell's Palsy	55	
Ramsay Hunt Syndrome	14	
Vestibular Schwannoma (Acoustic Neuroma)	9	
Asymmetric Crying Facies	1	
Birth Trauma	2	
Cavernoma Bleed	1	
Congenital Birth Defect	1	
Inteaneural Perineurioma of Cranial Nerves VII and VIII	1	
Salivary Gland Tumour	3	

Unspecified	4
Laterality (n)	
Unilateral Left-Side Affected	24
Unilateral Right-Side Affected	30
Not Reported	37
Facial Palsy Duration (months)	
Mean	104.69
SD	132.35
Facial Disability Index-Physical Function (% ability)	
Mean	50.93
SD	22.16
Facial Disability Index-Social and Wellbeing Function (% ability)	
Mean	48.97
SD	23.24

The research was delivered in two parts, taking 45-minutes total. The first comprised self-report questionnaires of psychosocial distress, and self-report measures and visual analogue scales of interpersonal interaction experience. The second involved a behavioural task assessing facial emotional mimicry. Completion of the task was optional, and so only completed by a subset (n=69) of participants. All participation was facilitated remotely via data collection platform, Gorilla (www.gorilla.sc; Anwyl-Irvine et al., 2020).

Facial Disability Index

Facial Disability Index (FDI) (Vanswearingen & Brach, 1996) was used to descriptively characterise facial functioning within the facial palsy group. FDI has two subscales related to physical and social functioning, each with 5 items, and has excellent psychometric properties in facial palsy samples (Özden et al., 2022). FDI provides an approximate indication of facial palsy severity (Volk et al., 2016), recording impairments in domains of physical functioning, such as eating and drinking, and social functioning, such as participating in social activities. The FDI scores observed in this sample (Table 5) are consistent with those observed in other facial palsy studies (e.g., Barry et al., 2019; Györi et al., 2018). FDI is included here as a descriptive statistic with the purpose of

characterising facial function in the facial palsy group; it is not included as an outcome measure given that FDI scores in facial palsy have been investigated comprehensively previously (e.g., Hotton et al., 2020; Volk et al., 2017).

Measures of Psychosocial Distress

Depression and anxiety symptoms were assessed using corresponding subscales of the Depression, Anxiety and Stress Scale–21 (DASS-21) (Antony et al., 1998). Subscales contain 7 statements, rated on a four-point scale (0-3). Higher scores indicate more pronounced symptoms. Both subscales have good psychometric properties (Crawford & Henry, 2003; Osman et al., 2012).

Appearance-related satisfaction was assessed using the Appearance subscale of the Body-Esteem Scale for Adolescents and Adults (Mendelson et al., 2001) (BESAA-A). It has 10 items. Responses are given on a five-point scale (0-4), with higher scores indicating greater appearance-related satisfaction. It has excellent test-retest reliability and convergent validity, regularly used to assess appearance-related satisfaction in visible difference populations (e.g., Zucchelli et al., 2023).

Measures of Interpersonal Interaction Experience

Subjective enjoyment of social interaction was assessed using the Anticipatory and Consummatory Interpersonal Pleasure Scale (D. C. Gooding & Pflum, 2014) (ACIPS). Seventeen items are rated using a six-point scale (1-6), with higher scores indicating greater experience of interpersonal pleasure. ACIPS has reasonable psychometric properties (test-retest r=.78, α=.86), helping operationalise reduced experience of interpersonal pleasure in psychopathology (e.g., Barkus, 2021).

Trait interpersonal empathy was assessed via the Interpersonal Reactivity Index (Davis, 1980) (IRI). It has 28 items rated on a five-point scale (0-4), with four subscales:

perspective taking (propensity to spontaneously adopt others' viewpoint), fantasy (tendency to transpose self imaginatively onto others), empathic concern (feelings of sympathy/concern for others), and personal distress (feeling uneasy during tense interpersonal scenarios). Higher subscale scores suggest heightened interpersonal empathic experience. IRI is a widely-used self-report empathy measure (Keaton, 2017).

Visual Analogue Scales

Two visual analogue scales (VAS) assessed subjective experience of interpersonal interaction using a sliding scale from -10 to +10:

VAS1. I find meeting new people:

Unpleasant (-10)----------O----------Pleasant (+10)

VAS2. Meeting people for the first time is:

Not exciting (-10)----------O----------Exciting (+10)

During coproduction it was decided to focus on meeting people for the first time to mitigate familiarity effects and underline two relevant aspects of interpersonal interaction experience (pleasure, excitement).

Facial Emotional Mimicry

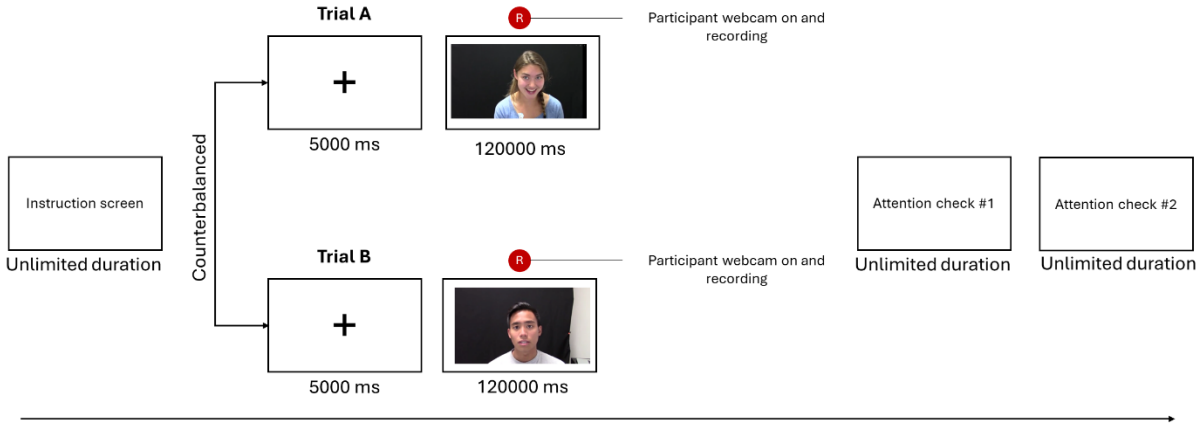
Facial emotional mimicry was assessed using a spontaneous mimicry task (Figure 7). Across trials A and B, participants watched stimuli from the Stanford Social Neuroscience Lab dataset (https://github.com/StanfordSocialNeuroscienceLab/SEND). Stimuli were selected following researcher screening, chosen because they were: a) positively coded and rated similarly in terms of valence, and b) featured content considered generalisable and relatable to participant experiences.

While watching the stimuli, participant audio and video responses were recorded via webcam. The intention was to catch demonstrations of spontaneous mimicry by capturing

participant facial expressions while they watched the stimuli. Participants were informed that they would be audio and video recorded during both trials, although were not aware that this was for the purpose of assessing mimicry.

Trials were counterbalanced across participants to mitigate order-related effects, beginning each time with a fixation cross. Each trial had a duration of two minutes. After both trials had run, brief attention checks prompted participants to respond to the question "*what did they talk about in the first/second video?"*.

Figure 8. *Format of facial emotional mimicry task.*



Data Processing

Self-Report Data

Data were screened for missing values and normality of distribution. As shown in Table 6, all participants provided complete data for DASS-21, BESAA-A, and ACIPS. Missing values were identified within IRI data, affecting comparison sample size (facial palsy group n=85, control group n=86). Similarly, missing values were identified in VAS responses across groups. As above, completion of the behavioural tasks was optional (n=69, 38.98% of sample).

Facial Emotional Mimicry

Extraction and processing of facial emotional mimicry data was completed using OpenFace 2.0:Facial Behavior Analysis Toolkit (Baltrusaitis et al., 2018).

Sixty-nine participants provided responses on the facial emotional mimicry task. Of these, eight were not eligible for further analysis due to insufficient recording quality as determined by OpenFace success criteria, whereby facial action data were not reliably extracted. Data from 61 participants were therefore available for analysis (facial palsy group n=29, control group n=32).

Data were extracted and processed as per Cannata et al. (2020), using the facial action coding system (Ekman & Friesen, 1978). The system identifies muscle activations involved in different facial movements, with facial action units AU06 and AU12 selected here because of their role in producing a smile/happy facial expression (Ekman & Friesen, 1978). AU06 codes the movement of the cheek raiser, involving the orbicularis oculi and pars orbitalis (eye region). AU12 codes the movement of the lip corner puller, involving the zygotic major (mouth region). Activity is coded using median intensity (scored 0-5) with higher median intensity values indicating more intense overall action unit movement.

After extracting action unit intensity, facial emotional mimicry was estimated per participant by calculating differences in eye (AU06) and mouth (AU12) intensity between the two stimuli (trials A, B) and corresponding participant recordings. The stimulus in trial A had a median eye intensity of 0.62 and a median mouth intensity of 2.23. The stimulus in trial B had a median eye intensity of 0.10 and a median mouth intensity of 1.09. Corresponding participant eye and mouth values for each recording were then subtracted from these values to provide a mimicry estimate. As this calculation meant that smaller values indicated greater mimicry, data were recomputed using the reciprocal function so

that larger values would instead indicate greater mimicry and smaller values indicate less mimicry. Once generated, mimicry estimates were then log(10) transformed to enhance uniformity.

Data Analysis

Non-parametric statistical tests were adopted throughout. The decision to use non-parametric approaches was based on non-normal distribution of data, as identified using skewness, kurtosis, and Shapiro-Wilk tests. Guidelines (e.g., Harris et al., 2008; Walker, 2017) recommend that non-parametric tests should be used in cases where normality assumptions are violated and where data manipulation techniques (like use of reciprocal function, described above) are applied. In such cases, non-parametric tests offer more conservative inferential estimates (Harris et al., 2008; Walker, 2017), and therefore were judged as appropriate for use in the analyses described below.

Self-Report Data

Mann Whitney U tests were run with the aim of characterising differences between groups in psychosocial distress and interpersonal interaction experience, calculating effect size as Cohen's *d* (.2=small, .5=medium, .8=large). Following this, group differences were analysed using non-parametric analysis of variance models (Quade nonparametric analysis of covariance). This was to establish whether group differences in interpersonal interaction experience remained statistically significant when controlling for depression and anxiety symptoms and appearance-related satisfaction. Models were run for each dependent variable in isolation (ACIPS, IRI, VAS) with group (facial palsy, control) as the between-subjects factor and depression, anxiety, and appearance-related satisfaction scores entered as covariates. Spearman's Rho Rank correlations were computed throughout to establish relationships between outcome variables.

Facial Emotional Mimicry

Group differences in facial emotional mimicry were analysed using mixed ANCOVA. The model had group (facial palsy, control) as a between-subjects variable and two within-subjects variables estimating facial emotional mimicry each with two levels, namely eye mimicry (trials A, B) and mouth mimicry (trials A, B). Models were run with and without laterality entered as a covariate. Greenhouse-Geisser correction was applied when the sphericity assumption was violated. Partial eta squared (ηp2) was computed as a measure of effect size, with effects defined as small (.01), medium (.06), and large (.14) (Cohen, 1992).

Associations between Self-Report Data and Facial Emotional Mimicry

Links between psychosocial distress, interpersonal interaction experience, and mimicry estimates were explored using nonparametric correlations. Correlations were computed to explore associations between variables across groups. For ease of interpretation, mean eye and mouth mimicry estimates were generated (by averaging eye and mouth mimicry across trials) and then correlated with self-report data, with relationships examined separately for both groups.

Ethics Statement

All procedures were approved by the Medical Sciences Division, University of Oxford (Ethics ID: R84320/RE001). All participants provided informed consent prior to participating. No participant compensation was offered.

Data Availability

All data are published on the Open Science Framework (https://osf.io/rkeuc/?view_only=0b3adce63ef342008a95cb2b19a14e3f).

Results

Psychosocial Distress

As shown in Table 6, depression symptoms were significantly different between groups, with participants with facial palsy reporting more pronounced symptoms (13.60±11.59) than controls (6.63±8.97) with a small effect size, U=5493.00, p<.001, d=.35. A similar result was observed in anxiety symptoms (10.70±10.14 vs 4.65±7.47) with a small effect size, U=5690.50, p<.001, d=.40. This indicates, as per hypothesis, that individuals with facial palsy experience more prominent symptoms of depression and anxiety than those without facial palsy.

Appearance-related satisfaction, as indexed by BESAA-A scores, was also significantly different between groups, with individuals with facial palsy reporting markedly lower appearance-related satisfaction (11.93±7.78) than controls (22.45±7.56), U=1291.50, p<.001, d=.58.

Correlations between depression and anxiety symptoms and appearance-related satisfaction were computed (see Appendix H) and identified significant negative associations between depression and anxiety symptomatology and appearance-related satisfaction in both groups.

Interpersonal Interaction Experience

It was hypothesised that facial palsy and control groups would report differences in interpersonal interaction experience, specifically in the experience of interpersonal pleasure (indexed by ACIPS). As shown in Table 6, findings were consistent with prediction in that those with facial palsy reported significantly less interpersonal pleasure (74.53±16.47) than controls (81.14±15.68) with a small effect size, U=2924.50, p=.004, d=.22.

Group differences in ACIPS scores were supplemented by VAS responses. Significant differences in responses were observed between groups, with the facial palsy group reporting significantly less feelings of perceived pleasure (-1.01±6.89) and excitement (-1.90±5.81) than the control group (4.17±6.07, 3.45±4.73 respectively), U=2041.00, p<.001, d=.37 and U=1665.00, p<.001, d=.46.

Comparisons of empathy dimensions across groups revealed minimal significant differences. Fantasy dimension scores were significantly different between groups, $t(169)$=2.693, p=.008, d=.41, with facial palsy participants reporting lower scores (13.44±5.97) than controls (15.73±5.16), but this was the only statistically significant group difference observed across empathy dimensions.

Correlations between measures of interpersonal interaction experience were computed (Appendix H). In the facial palsy group, a significant correlation between ACIPS scores and empathy (fantasy dimension) was observed, $r^s(83)$=.305, p=.005, although this relationship was not mirrored in the control group, $r^s(84)$=.090, p=.409. In the facial palsy group, no significant associations between VAS responses and empathy dimensions were observed. In contrast, in the control group, positive correlations between VAS responses and perspective taking, $r^s(80)$=.331, p=.002, and empathic concern, $r^s(80)$=.230, p=.037, $r^s(80)$=.260, p=.018, dimensions were observed.

Associations Between Psychosocial Distress and Interpersonal Interaction Experience

Both groups demonstrated associations between psychosocial distress and interpersonal interaction experience (Appendix H). Depression and anxiety symptoms were negatively correlated with ACIPS scores in both groups, suggesting that perceived enjoyment of interpersonal experience decreases as depression and anxiety symptoms increase. Associations between depression and anxiety symptoms and reduced interpersonal

interaction pleasure were also observed in VAS outcomes, reaching statistical significance in the control group only. Depression and anxiety scores positively correlated with scores on the personal distress empathy dimension in both facial palsy and control groups, with fantasy scores also positively correlating with anxiety scores in the facial palsy group only. No other significant associations between empathy dimensions and depression and anxiety symptoms were observed.

For appearance-related satisfaction, positive associations were observed between scores and interpersonal interaction experience in both groups (see Appendix H), suggesting associations between greater appearance-related satisfaction and positive interpersonal interaction experiences. Greater appearance-related satisfaction was associated with increased scores on the perspective taking empathy dimension but in control group only, $r^s(84)=.239$, $p=.027$.

Given these associations, supplementary analyses examined whether group differences in interpersonal interaction experience remained after controlling for depression and anxiety symptoms and appearance-related satisfaction. A propensity towards attenuated interpersonal interaction experiences might be a feature of depression, anxiety, and/or appearance-related symptomatology, and so it was important to investigate whether group differences in interpersonal interaction experience persisted once controlling for these. When controlling for depression, anxiety, and appearance-satisfaction, group differences in VAS excitement ratings remained statistically significant, $F(1, 167)=6.643$, $p=.011$, indicating individuals with facial palsy might find meeting new people less exciting than those without facial palsy, even once controlling for depression, anxiety, and appearance-related satisfaction. A similar finding was observed within the fantasy empathy dimension, $F(1, 169)=7.295$, $p=.008$, indicating differences between groups that are not explained by the covariates. However, other indices of interpersonal interaction experience did not

remain significantly different between groups when controlling for depression, anxiety, and appearance-related satisfaction.

Table 6. *Self-report outcome measure scores.*

	Facial Palsy Group (n=91)			Control Group (n=86)		
	Mean (SD)	Range (Possible)	N	Mean (SD)	Range (Possible)	N
Psychosocial Distress						
DASS21 Depression	13.60 (11.59)	0-42 (0-42)	91	6.63 (8.97)	0-38 (0-42)	86
DASS21 Anxiety	10.70 (10.14)	0-42 (0-42)	91	4.65 (7.47)	0-34 (0-42)	86
BESAA-A	11.93 (7.78)	0-29 (0-50)	91	22.45 (7.56)	0-35 (0-50)	86
Interpersonal Interaction Experience						
ACIPS Total	74.53 (16.47)	34-102 (17-102)	91	81.14 (15.68)	29-102 (17-102)	86
IRI Perspective Taking	17.80 (5.30)	4-28 (0-28)	85	16.89 (5.26)	1-27 (0-28)	86
IRI Fantasy	13.44 (5.97)	2-28 (0-28)	85	15.73 (5.16)	1-27 (0-28)	86
IRI Empathic Concern	21.91 (4.37)	9-28 (0-28)	85	20.72 (5.04)	2-28 (0-28)	86
IRI Personal Distress	10.65 (5.55)	0-23 (0-28)	85	10.62 (5.23)	0-22 (0-28)	86
VAS Unpleasant-Pleasant	-1.01 (6.89)	-10 to +10 (-10 to +10)	87	4.17 (6.07)	-10 to +10 (-10 to +10)	82
VAS Not Exciting-Exciting	-1.90 (5.81)	-10 to +10 (-10 to +10)	87	3.45 (4.73)	-10 to +10 (-10 to +10)	82

Table 7. *Correlations between mimicry and self-report variables.*

	Facial Palsy Group		Control Group	
	Eye Mimicry	Mouth Mimicry	Eye Mimicry	Mouth Mimicry
Psychosocial Distress				
DASS21 Depression	.256	.081	.078	-.016
DASS21 Anxiety	.211	.057	.113	-.225
BESAA-A	-.054	.035	.072	.149
Interpersonal Interaction Experience				
ACIPS Total	-.125	.297	-.029	-.131
IRI Perspective Taking	-.188	-.130	.030	-.011
IRI Fantasy	.015	.075	-.250	-.002
IRI Empathic Concern	-.222	-.069	-.035	-.005
IRI Personal Distress	-.112	.126	-.043	-.006
VAS Unpleasant-Pleasant	-.123	.005	-.008	.054
VAS Not Exciting-Exciting	-.195	.046	.100	.101

*= significant at p =.05; **= significant at p=.01; all values r

Facial Emotional Mimicry

Group facial emotional mimicry was compared via mixed ANCOVA with and without controlling for laterality (results controlling for laterality presented, no change in effect direction or statistical significance when controlled/not controlled for). A significant main effect of trial on mimicry was found for both eye, $F(1, 58)=17.80$, $p< .001$, $\eta p2=.235$, and mouth, $F(1, 58)=43.77$, $p< .001$, $\eta p2=.430$, with post-hoc tests with Bonferroni correction suggesting more mimicry in trial B (eye=.874, mouth=.957) than trial A (eye=.640, mouth=.556). No significant main effect of group was observed, $F(1, 58)=0.93$, $p=.762$, $\eta p2=.002$. Similarly no significant interaction effects between group and eye or mouth mimicry were observed, $F(1, 58)=2.51$, $p=.118$, $\eta p2=.042$ and $F(1, 58)=0.11$, $p=.745$, $\eta p2=.002$, respectively.

This indicates that groups with and without facial palsy do not demonstrate significant differences in spontaneous facial emotional mimicry in eye or mouth regions.

Associations between Psychosocial Distress, Interpersonal Interaction Experience, and Facial Emotional Mimicry

Correlations between eye and mouth mimicry and self-report measures of psychosocial distress and interpersonal interaction experience were computed (Table 7). As shown, no significant associations between mimicry, psychosocial distress, and interpersonal interaction experience were observed across groups.

Discussion

This study investigated differences in psychosocial distress and interpersonal interaction experience between groups with and without facial palsy, exploring potential associations with facial emotional mimicry.

It was predicted that groups would demonstrate differences in self-reported psychosocial distress (H1). Participants with facial palsy reported significantly more depression, anxiety, and appearance-related dissatisfaction than controls, replicating findings of previous research (e.g., Hotton et al., 2020) which has observed differences in psychosocial wellbeing between groups with and without facial palsy. Significant correlations between metrics of psychosocial distress were observed across groups, showing that heightened depression and anxiety symptoms are both related to one another and decreased appearance-related satisfaction. Taken together, these findings underline that facial palsy is associated with marked mood and appearance-related symptomatology, highlighting the potential psychosocial needs of this patient group.

Group differences in interpersonal interaction experience were observed. It was hypothesised (H2) that those with facial palsy would report reduced feelings of interpersonal pleasure and excitement as indexed by ACIPS and VAS, and this prediction was supported. While there is increasing evidence for impacted social and interpersonal behaviour in facial palsy (e.g., Bogart et al., 2015; Hamlet et al., 2021), in using ACIPS and VAS, the presented study shows that interpersonal pleasure and excitement may be particularly salient, especially as excitement ratings remained significantly different between groups after controlling for psychosocial distress. Experience of interpersonal empathy was also measured, with the fantasy dimension emerging as significantly different between groups. Findings therefore indicate that individuals with facial palsy may experience interpersonal interactions as less pleasurable or exciting, impacting social motivation (Lyford-Pike & Nellis, 2021), social imagination (as indexed by fantasy dimension) and social anxiety (Siemann et al., 2023). It may be important therefore for conceptualisations of interpersonal behaviour in facial palsy to account for pleasure and excitement processes – the experience of interpersonal interactions as less rewarding may

precede adjustments in social behaviour, adding to psychosocial distress associated with facial palsy.

Informed by SRF (Hess & Fischer, 2022), the presented study explored associations between psychosocial distress, interpersonal interaction experience, and facial emotional mimicry. As a theoretical framework, SRF proposes that facial emotional mimicry facilitates interpersonal interaction experience and associated psychosocial wellbeing, and it was therefore anticipated that difficulties with facial emotional mimicry might contribute to the group differences described above. However, no significant facial emotional mimicry effects were observed when comparing eye and mouth mimicry between groups (refuting H3). Moreover, it was hypothesised (H4) that facial emotional mimicry would be associated with indices of psychosocial distress and interpersonal interaction experience. However, no significant relationships between mimicry and self-report variables were observed in either group. As such, the presented findings indicate, contrary to prediction, that groups with and without facial palsy do not demonstrate significant differences in facial emotional mimicry, with limited evidence for associations between mimicry, psychosocial distress, and interpersonal interaction experience.

In summary, findings suggest that individuals with facial palsy report pronounced psychosocial distress and less pleasurable/exciting interpersonal interaction experiences. However, based on data provided, facial emotional mimicry is unlikely to be an explanatory mechanism, with no group differences in mimicry observed. This is an important finding, given that facial emotional mimicry has previously been suggested as a contributing factor to psychosocial distress and interpersonal interaction experiences in facial palsy (De Stefani et al., 2019; Hotton et al., 2020; Nellis et al., 2018).

Clinical Implications

There is growing evidence for self-help and 1:1 psychological therapies for people with visible differences (like facial palsy) (e.g., Hotton et al., 2022; Norman & Moss, 2015; Waite et al., 2024) which, based on findings observed, should consider the role of interpersonal functioning (reduced pleasure and excitement) in maintaining distress. For example, psychological therapies addressing distress (like behavioural activation) should pay attention to interpersonal aspects and look to increase positive social interaction experiences, in-turn improving psychosocial wellbeing. Indeed, it appears, based on presented findings, that opportunities for positive interpersonal interaction experience could be a therapeutic target for intervention, independent of participant experience of facial emotional mimicry.

Limitations

Considerations within design and methodology limit the representativeness and strength of presented findings. Power analyses estimated sample sizes required for the desired comparisons. However, due to dropouts and incomplete data, not all comparisons met sample size thresholds and therefore should be replicated in sufficiently powered samples. While controlling/not controlling for laterality did not have a significant influence on outcomes, laterality data were not available for all facial palsy participants, and so its inclusion as a control variable is preliminary and effects should be re-tested while including full laterality data. Brief self-report measures were used to increase participation accessibility and reduce participant burden. However, including more comprehensive measures (e.g., Beck Depression Index; behavioural assessments of social motivation) might have allowed for more precise examinations of group differences, particularly given potential overlaps between mood and interpersonal interaction experience (e.g., anhedonia in depression; Barkus, 2021). Moreover, users of psychotropic medication were not

eligible to participate because of potential medication effects on symptomatology (e.g., rating of symptoms) and mimicry (e.g., psychomotor responses), restricting sample representativeness and generalisability. Finally, groups with and without facial palsy have been compared, analysed as homogenous groups when (of course) diagnosis type and duration (Table 5), for example, are going to influence outcomes. It was however beyond the scope of this research to investigate these individual differences in more detail.

Future Research Directions

This research explored whether facial emotional mimicry is related to psychosocial wellbeing and interpersonal interaction experience in facial palsy. While no statistically significant associations were found (H3 and H4), it will be important for future research to develop the techniques used here with the aim of inferring directionality and causality of effects. From a measurement perspective, future research directions therefore include integration of holistic mimicry measures (such as motion energy intensity; Cannata et al., 2020) and more sensitive methodological approaches, such as lab-based EMG (Westermann et al., 2024), to help detect more subtle facial movements and thereby clarify associations between mimicry, psychosocial wellbeing, and interpersonal interaction experience. From a theoretical standpoint, future research should consider using these more sensitive techniques to support the mapping of causal and moderating effects of mimicry in psychosocial distress and interpersonal interaction experience. A better understanding of directionality and causality would have implications for practice, with insight regarding mechanism and causality informing interventions and clinical outcomes. The research presented here could not make inferences about whether mimicry causes changes in distress and interaction experience, for example, because of sample size restrictions meaning such analyses (e.g., structural equation modelling) would not be appropriate. Future research should look to address this.

It will also be important for future research to consider the role of recovery. While this research has suggested that people with a current diagnosis of facial palsy experience adjustments in psychosocial distress and interpersonal interaction experience, the extent to which these adjustments remain once treatment is complete is currently unknown. Reviews (e.g., Luijmes et al., 2017; Vaughan et al., 2020) indicate that quality of life improves following treatment and recovery in facial palsy, but the extent to which this is associated with changes in psychosocial distress, interpersonal interaction experience, and mimicry is unclear. An important future direction therefore is to develop longitudinal measures of psychosocial distress, interpersonal interaction experience, and mimicry, with the aim of characterising how the presented findings change in-line with facial palsy treatment and recovery.

Conclusion

This study investigated psychosocial distress and interpersonal interaction experience in facial palsy. Comparing matched groups, findings demonstrated significantly more psychosocial distress and reduced interpersonal pleasure/excitement in facial palsy compared to controls. Applying SRF to examine the potential role of facial emotional mimicry, findings showed no group differences in mimicry and limited associations between mimicry and self-report measures. Together, findings indicate that individuals with facial palsy present with marked psychosocial and interpersonal needs, although these appear to be independent of facial emotional mimicry based on the data presented.

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EXECUTIVE SUMMARY

Why this research was conducted: The psychosocial impact of facial palsy is increasingly recognised. Previous studies have shown that people with facial palsy experience more pronounced feelings of depression and anxiety, also reporting a lower quality of life. The social effects are also considerable, with people with facial palsy reporting impacts on the quality of their relationships, their social motivation, and the way it feels to meet new people.

One possible mechanism potentially contributing to the feelings reported by people with facial palsy is facial emotional mimicry. Research, for example the Social Regulator Framework, defines facial emotional mimicry as the spontaneous mirroring of facial expressions, for example smiling. Mimicry is thought to be an evolutionary function which serves a variety of interpersonal purposes, including affiliation, bonding, and emotion recognition.

Because of its impact on facial muscle movements, it is possible that facial palsy affects facial emotional mimicry. Therefore, the rationale for the presented study was that reduced facial emotional mimicry might be associated with the psychosocial experiences described by people with facial palsy. If mimicry is reduced, the interpersonal purposes of mimicry might be disrupted, affecting social experience and psychosocial wellbeing.

This research was conducted with the objective of investigating the above rationale. It sought to establish whether individuals with and without facial palsy report differences in psychosocial wellbeing and interpersonal interaction experience and, if so, explore associations between these variables and facial emotional mimicry. This was with a view to informing clinical practice and the development of psychosocial interventions in facial palsy, such as behavioural activation with an interpersonal focus.

What the research involved: People with (n=91) and without (n=86) facial palsy completed self-report questionnaires which asked about psychosocial wellbeing (depression, anxiety, and appearance-related satisfaction) and interpersonal interaction experience (interpersonal pleasure and excitement and interpersonal empathy). A subset (n=61) completed a behavioural task which assessed spontaneous emotional mimicry while watching emotive videos.

People with any form of unilateral facial palsy were eligible to take part. All participants were over the age of 18 and spoke English sufficiently well to complete the research without issue. People using psychotropic medications, with a diagnosed neurodevelopmental condition, and/or with hearing or speech impediments which might affect participation, were not eligible to take part. Participant age and gender were matched between groups.

What the research found: Findings revealed significant differences in psychosocial wellbeing and interpersonal interaction experience between groups. People with facial palsy reported more marked symptoms of depression and anxiety, reported less appearance-related satisfaction, and reported less feelings of interpersonal pleasure and excitement. However, no significant associations between these domains and facial emotional mimicry were observed.

Conclusion: The presented findings add to the growing body of evidence describing the psychosocial needs of people with facial palsy. The findings replicate previous research in highlighting that facial palsy is associated with more depression, anxiety, and appearance-related distress. In showing differences in interpersonal pleasure and excitement, the research underlines that enjoyment of social relationships might be impacted in facial palsy, and therefore more clinical emphasis should be given to improving interpersonal

interaction experiences as part of therapy. Importantly, in showing limited associations with facial emotional mimicry, the findings provide preliminary evidence that mimicry may not correspond to psychosocial experiences in the way that theory (like the Social Regulator Framework) might predict. Future research should develop the presented methods and findings, perhaps using more sensitive and specific assessments of facial emotional mimicry, to examine effects across different types of facial palsy (e.g., Bell's palsy; Moebius syndrome) and different recovery stages. This will help refine the clinical utility of the presented findings.

CONNECTING NARRATIVE

This reflective connecting narrative describes the process of completing the three research projects presented in this thesis. While different in scope, the three projects reflect my two main areas of interest in clinical psychology – clinical health and forensic mental health – and are similar in that they all aim to use theory-practice links to inform the care provided to populations which do not always have routine access to psychological input.

Systematic Review of the Literature

The systematic review and meta-analysis focused on psychological features in voice disorders. Voice disorders are conditions impacting the production of sound and vocal quality, with understandable implications for wellbeing and psychosocial functioning. Like many areas of physical health care, there is increasing awareness of the role of psychological factors in voice disorders and yet psychological professions are not well-represented within clinical voice services, nor are most psychologists aware of the mental health needs of this patient population. It was interesting to notice how the initial rationale for the review unfolded from this. I was hearing from colleagues and friends working in voice about their desire for greater psychological input into services but could not see any recent comprehensive accounts of psychological characteristics in this area.

Looking ahead, I am hoping that the review might help improve access to, and awareness of, psychological principles and concepts in voice care services. It has been pleasing to see how voice practitioner and patient communities have responded to review outcomes, and I have enjoyed being invited to conferences and events to talk more about the work. The review makes recommendations for future research and clinical practice, and following the review, I am motivated to apply for a small research grant to explore these themes in more detail.

Service Improvement Project

The service improvement project was developed in collaboration with the Thames Valley Forensic Mental Health Service. I knew coming into training that I would like to continue my research work in forensic services, although had not completed any service or quality improvement projects previously. I found it challenging at first to develop an improvement project – grounded in existing data and practice – as opposed to a more empirical project which might gather new data or information. This was in-part a consequence of my lack of experience with improvement projects and bias towards quantitative and experimental research approaches. It was important therefore to keep reflecting on the service aims for the project, using a formal quality improvement cycle (PDSA) to ensure the project kept to its service improvement focus.

The project was initially designed to survey staff and service user perspectives, with the intention of pursuing NHS ethics approval for service users to also complete the questionnaire. However, logistical pressures and project ethics timelines meant that the project had to be restructured part-way through and the decision was made to only survey staff perspectives. It was challenging to navigate the restructuring of the project amidst competing demands, needing to use supervision effectively and seek oversight from the forensic quality improvement hub to set new project deadlines.

Theory Driven Research Project

The idea for the theory driven research project came from my PhD work on social reward processing in psychopathology. I became interested in emotional mimicry and its potential role in facilitating interpersonal pleasure, curious about how this process might be impacted in clinical populations where emotional mimicry might be adjusted due to facial muscle impairments, like facial palsy.

From the outset it was described as an ambitious project. Using a series of self-report measures alongside an experimental task required a lot of preparation and development time (e.g., programming the mimicry task, learning to use new software), and it was interesting to reflect on my reactions to this. In terms of scope, this project was most like the research I had completed prior to training, yet I had far less time than I might have expected to dedicate to it, and I think I underestimated the extent to which I would find it difficult to balance its demands alongside the other projects. These feelings were compounded by an initially slow participant recruitment process, with concerns that the project might be too ambitious and need to be scaled back. It was exciting to eventually deliver the project in the way it was intended, identifying interesting exploratory findings and themes for future research to investigate more comprehensively.

The project featured some joint working with another trainee (see detail and justification in Title Page and Appendix I). It was helpful to have the support of another trainee during participant recruitment, given the high participant burden and initially slow recruitment process. All conceptualisation, design, analysis, and write-up phases of the project were completed independently.

Throughout the project I was struck by how motivated the facial palsy community are to share their experience. I was lucky to have the support of Facial Palsy UK in promoting the research, with active coproduction between the research team and experts-by-experience. From the feedback of those with lived experience, I hope this research helps to raise awareness of the psychological impact of facial palsy, informing the development of more effective psychosocial interventions for this group.

Summary

The three projects have been interesting and varied. It was good to have a balance of clinical health psychology and forensic research, using a broad range of skills and methods. I have always been passionate about research, and so it was interesting to notice myself feeling apathetic and demotivated at times, using supervision to think about how this might be linked to feelings of burnout and the other demands of clinical training. I came into training with the idea that I might one day pursue a clinical academic career, and it is exciting that these three projects have given me ideas for grant applications and ways to embed research as part of my career development plan.

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APPENDICES

Appendix A Published version of systematic review

Published version of article is available online in the Journal of Voice:
https://doi.org/10.1016/j.jvoice.2023.09.012

Appendix B Publishing guidelines for International Journal of Mental Health

Instructions for authors

Thank you for choosing to submit your paper to us. These instructions will ensure we have everything required so your paper can move through peer review, production and publication smoothly. Please take the time to read and follow them as closely as possible, as doing so will ensure your paper matches the journal's requirements.

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Research Article, Reviews

Should be written with the following elements in the following order: title page; abstract; keywords; main text introduction, materials and methods, results, discussion; acknowledgments; declaration of interest statement; references; appendices (as appropriate); table(s) with caption(s) (on individual pages); figures; figure captions (as a list)

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Although a section on practice or policy recommendations in the Discussion is not mandatory, we encourage authors to consider how their research could be useful for forensic mental health practitioners. Furthermore, since this is an international journal, we ask that authors provide sufficient detail to allow readers to understand the context (laws, clinical practices, geography, etc.) in which the research has occurred and to describe how results/findings may be relevant to and impact practitioners, policymakers and researchers around the world. A 'Practice and Policy Impact' section or something similar may be useful within the Discussion to help draw attention to the potential impacts of the manuscript.

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- psychosocial mediators and moderators of health-related behaviours
- influence of emotion on health and health-related behaviours
- psychosocial processes relevant to disease outcomes
- psychological interventions in health and disease
- emotional and behavioural responses to ill health, screening and medical procedures
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Papers must make a clear potential contribution to health psychology theory, knowledge and/or practice and employ rvigorous research design and methodology..

We do not typically publish cross-sectional studies or those using only student populations unless there is a strong rationale for doing so.

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For help with submissions, please contact: Jeyashree Ramamoorthy, Editorial Assistant, bjhp@wiley.com or phone +44 (0) 116 252 9504.

Appendix D Prospero record

PROSPERO

International prospective register of systematic reviews

Clinical psychology and voice disorders: A systematic review of studies comparing psychological characteristics across individuals with and without voice disorders

Luke Aldridge-Waddon, Matthew Hotton

Review methods were amended after registration. Please see the revision notes and previous versions for detail.

Citation

Luke Aldridge-Waddon, Matthew Hotton. Clinical psychology and voice disorders: A systematic review of studies comparing psychological characteristics across individuals with and without voice disorders. PROSPERO 2022 CRD42022352972 Available from: https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42022352972

Review question

1. Are there differences in psychological wellbeing and personality between individuals with and without voice disorders?

2. Are there differences in psychological wellbeing and personality across voice disorder types, for example functional versus organic voice disorders?

Searches

Sources: PubMed; CINAHL; PsycINFO via Ovid; MEDLINE via Ovid; Web of Science;

Embase. Search dates: No date restriction applied (i.e., all to present).

Restrictions: Language (published in English or English-translated).

Unpublished studies will not be included.

Forward and backward citation searching will be applied.

Searches to be re-run just before final analyses. Any further relevant studies will then be included.

Types of study to be included

Inclusion criteria:

1. Studies comparing psychological wellbeing and/or personality across two or more clinical or control groups.
2. Studies correlating psychological wellbeing or personality measures with voice symptomatology will be eligible, provided between-group comparisons are reported as an outcome variable.

Exclusion criteria:

1. Studies only examining superordinate constructs (e.g., quality of life, locus of control) will not be eligible for inclusion.
2. Epidemiological studies estimating psychiatric morbidity will not be eligible for inclusion.
3. Case reports and opinion pieces will not be eligible for inclusion.

Condition or domain being studied

Voice disorders affect vocal performance. They are broadly categorised as organic (i.e. difficulties with vocal production due to lesions and/or structural changes) or functional (i.e., difficulties with vocal production in the absence of organic pathology) (Baker et al., 2007; Payten et al., 2022). Common symptoms include aphonia, hoarseness, asthenia, and vocal roughness or strain (Payten et al., 2022). Whilst everyday difficulties with vocal production are relatively common, clinical prevalence estimates suggest 1.7% of the general population experience voice disorder symptoms to the degree that personal or professional functioning is impaired (Benninger et al., 2017) and thus clinical intervention is required.

The voice is essential for everyday communication, and thus difficulties with vocal production can markedly impact daily functioning, including psychological wellbeing (Gray et al., 2021; Kollbrunner & Seifert, 2017). Comorbidity estimates suggest 47% of individuals with voice disorder diagnoses present with significant mental health difficulties (Jordan et al., 2020), highlighting the potential psychological needs of this patient group (Andrea et al., 2017; Baker, 2008).

The proposed systematic review and meta-analysis will identify the psychological factors associated with voice disorder symptomatology and thereby highlight the potential benefits of including clinical psychology input within voice disorder research and practice.

Participants/population

Inclusion criteria:

1. Clinical group(s) - participants with voice disorder diagnoses (functional or organic). Voice disorder will be defined as per the Classification Manual for Voice Disorders–1 (Verdolini et al., 2006).
2. Control group - participants without voice disorder diagnosis.
3. All participants should be assessed using standardised measures of psychological wellbeing and/or personality.
4. All participants should be adult (age 18+).

Exclusion criteria:

1. Studies of children and young people.

Intervention(s), exposure(s)

Inclusion criteria (exposure):

1. Clinical group(s) - having a voice disorder diagnosis.
2. Control group - no voice disorder diagnosis.
3. Both no-intervention and intervention studies are eligible, provided that sufficient baseline data are collected for intervention studies

Comparator(s)/control

Inclusion criteria:

1. Control group participants do not have a formal voice disorder diagnosis.

Context

Inclusion criteria:

1. Studies examining the psychological characteristics of adults with and without voice disorders.
2. Studies conducted in clinical and community settings.
3. Studies conducted in any geographical region.

Exclusion criteria:

1. Unpublished work.

2. Dissertations.
3. Studies published in languages other than English.

Main outcome(s)

The proposed review aims to improve understanding about the psychological impact of voice disorders. It aims to do so by:

a. Comparing indices of psychological wellbeing and personality across individuals with and without voice disorders.
b. Identifying psychological factors involved in voice disorder development and maintenance via an updated psychological framework of voice disorders.
c. Establishing scope for clinical psychology input within voice disorder assessment and treatment.

Measures of effect

If meta-analyses are conducted, the effect size of group differences will be measured using Cohen's d. The feasibility and appropriateness of conducting meta-analyses depends on the number of eligible studies and the homogeneity of these studies.

Additional outcome(s)

None.

Data extraction (selection and coding) [1 change]

Two reviewers will independently search the computerised databases listed above using the search strings presented in the attached .pdf.

Search hits will be collated and duplicates will be removed. Titles and abstracts will be screened first, with 20% screened by a second reviewer. Next, full texts will be screened for eligibility. The second reviewer will screen 25% of full texts. Inter-reviewer reliability and agreement regarding inclusion will be determined using Cohen's K and/or rater percentage agreement. Discrepancies will be discussed before asking the second reviewer to screen an additional 25% of articles if required.

The following data will be extracted:
Study characteristics - year, sample size (per group), participant recruitment method, design, geographical location of study.
Participant characteristics (per group) - clinical/community sample, age, gender, ethnicity, physical health diagnoses, mental health diagnoses.
Measures - measures used to diagnose voice disorder and/or assess voice symptomatology, measures used to assess psychological wellbeing (e.g., anxiety, depression, trauma) and personality (e.g., big five personality traits).
Outcomes - descriptive statistics (mean, SD) per group, correlation coefficients (if provided), statement of group differences (if descriptive statistics not provided).

Extracted data will be entered into an excel spreadsheet shared by reviewers. All entries will be made independently. Data extracted by each reviewer will then be compared for agreement and accuracy. Disagreements will be resolved and consultation with third-party will be sought if required. This data extraction, agreement, disagreement, and resolution process will be recorded.

Risk of bias (quality) assessment

Study quality will be assessed via the Newcastle-Ottawa Scale. The scale is designed to estimate the quality of cohort and case-controlled studies and is suitable for use in meta-analytic reviews.

Publication bias will be formally assessed via funnel plot inspection and the Egger (Egger et al., 1997) and Begg (Begg & Mazumdar, 1994) tests of publication bias.

Strategy for data synthesis

All reviewed articles will be synthesised descriptively via written prose using a narrative synthesis.

Meta-analysis will be conducted if feasible and appropriate (i.e., sufficient number of studies, homogeneity between studies, mean and standard deviation values of reported). Meta-analyses will examine differences in psychological wellbeing or personality scores across clinical and control groups, with separate analyses for each wellbeing or personality trait examined. This might include examining differences within clinical groups (e.g., functional versus organic) as well as clinical versus control differences. The meta-analyses will be conducted using Jamovi. Random-effects models will be computed. Heterogeneity will be estimated using Tau squared. Effect size will be estimated using Cohen's d.

Analysis of subgroups or subsets

None planned, could analyse group differences by diagnosis if sufficient data available.

Contact details for further information

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Organisational affiliation of the review

University of Oxford

Review team members and their organisational affiliations

Dr Luke Aldridge-Waddon.
University of Oxford

Dr Matthew Hotton. University of
Oxford

Type and method of review

Meta-analysis, Narrative synthesis, Systematic review

Anticipated or actual start date

30 August 2022

Anticipated completion date

01 September 2023

Funding sources/sponsors

Not applicable

Language

English

Country

England

Stage of review

Review Complete

Subject index terms status

Subject indexing assigned by CRD

Humans; Psychology, Clinical; Voice Disorders; Voice Quality

Date of registration in PROSPERO

24 August 2022

Date of first submission

24 August 2022

Stage of review at time of this submission

The review has not started

Stage	Started	Completed
Preliminary searches	No	No
Piloting of the study selection process	No	No
Formal screening of search results against eligibility criteria	No	No
Data extraction	No	No
Risk of bias (quality) assessment	No	No
Data analysis	No	No

Revision note

Description of inter-reviewer agreement during screening has been updated. This has been updated to include percentage agreement and/or Cohen's K as a way of determining reliability of agreement between reviewers.

The record owner confirms that the information they have supplied for this submission is accurate and complete and they understand that deliberate provision of inaccurate information or omission of data may be construed as scientific misconduct.

The record owner confirms that they will update the status of the review when it is completed and will add publication details in due course.

Versions

24 August 2022
05 December 2022

PROSPERO
This information has been provided by the named contact for this review. CRD has accepted this information in good faith and registered the review in PROSPERO. The registrant confirms that the information supplied for this submission is accurate and complete. CRD bears no responsibility or liability for the content of this registration record, any associated files or external websites.

Appendix E Staff questionnaire used in service improvement project

Staff Questionnaire

Forensic service improvement project survey

Thank you for taking the time to complete our survey. We are inviting staff within the Thames Valley Forensic Service to share their views and experience regarding caring for people with a diagnosis of personality disorder. This is with the aim of understanding more about how staff currently understand and experience personality disorder within a forensic context. The results of this survey will help to inform service development and improvement.

The survey has five sections and should take a maximum of 10 minutes to complete. All questions are optional. Some use rating scales, asking you to indicate how much you agree with statements. Some are multiple choice questions. Others are open-answer questions, inviting you to share your experience and perspective via written prose. Please answer all questions if you can.

All responses are collected anonymously. Please note that participation is only complete once the full form has been filled and submitted on the final page.

Thank you for your participation.

Study Information Sheet and Consent

If you would like to read more information about the study, you can do so by following this link: https://ohft365-my.sharepoint.com/:b:/g/personal/luke_aldridgewaddon_oxfordhealth_nhs_uk/EX3HJTnuF0NPq-NLYPHEBs4BPnnEfr3apAxSxLs2CoHwzw?e=a4zSd9. Please note you will need to be logged into your Oxford Health NHS account in order to view link content.

Please note you may only participate in this survey if you are 18 years of age or over.

[ ] I certify that I am 18 years of age or over.

If you have read the information above and agree to participate with the understanding that the data you submit will be processed accordingly, please tick the box to start [ ]

Section 1: Experience

The first section of the survey asks about your current experiences working with personality disorder.

In my current role…

I work with service users who have a formal diagnosis of personality disorder and/or who might be considered to present with personality-related difficulties.

[] Yes [] No [] Unsure

I am asked to conduct assessments and/or make diagnoses related to personality disorder or personality difficulties.

[] Yes [] No [] Unsure

Please provide more information if you would like to:

I am involved in risk assessment and/or care and management plans which require me to consider the role of personality.

[] Yes [] No [] Unsure

Please provide more information if you would like to:

I have conversations with service users about personality disorders, for example talking with someone about their diagnosis or discussing what a diagnosis means to them.

[] Never [] Rarely [] Sometimes [] Often

I have conversations with staff about personality disorders, for example talking with other team members about how someone's personality might link into the care they receive within the service.

[] Never [] Rarely [] Sometimes [] Often

Section 2: Current Care

The second section asks about your experiences of personality disorder in your current practice in the service. Please respond to the statements using the provided rating scales.

Based on my experience in my current role within the service, I think…

People with and without personality diagnoses receive the same quality of care.

[] Strongly disagree [] Disagree [] Neutral [] Agree [] Strongly agree

People with and without personality diagnoses experience equal opportunities.

[] Strongly disagree [] Disagree [] Neutral [] Agree [] Strongly agree

Having a personality diagnosis is a facilitator to progress within the service.

[] Strongly disagree [] Disagree [] Neutral [] Agree [] Strongly agree

People with personality disorder diagnoses have care packages and plans that are well tailored to their individual needs.

[] Strongly disagree [] Disagree [] Neutral [] Agree [] Strongly agree

People with personality diagnoses experience more restrictive practices. [] Strongly disagree [] Disagree [] Neutral [] Agree [] Strongly agree
Staff members differ in the language they use when talking about personality disorders. [] Strongly disagree [] Disagree [] Neutral [] Agree [] Strongly agree
Staff members use appropriate language when talking about personality disorders. [] Strongly disagree [] Disagree [] Neutral [] Agree [] Strongly agree
Staff members currently adopt a trauma-informed approach when working with people with personality disorder diagnoses. [] Strongly disagree [] Disagree [] Neutral [] Agree [] Strongly agree
If you would like to provide more information about any of those responses, please do so:
Section 3: Knowledge *The third section of the survey asks about your knowledge of concepts in personality disorder research and practice. This is to help us understand staff perspectives on how we define and characterise personality disorders within the service. Please answer the questions using the rating scales and response boxes provided*.
Based on your current experience and training, how would you define "personality disorder"?
How much confidence do you have that the definition you have provided above is consistent with current clinical guidance? (0-100%)
Based on your current experience and training, how familiar are you with categorical perspectives on personality disorder? (1-10)
Based on your current experience and training, how familiar are you with dimensional perspectives on personality disorder? (1-10)
Please provide more information on your familiarity with categorical and dimensional perspectives if you would like to:
Section 4: Current Skills *The fourth section asks about your feelings of confidence and competence in your current role related to personality disorder. Please respond to the statements using the provided drop-down options*.
I have the necessary knowledge about working with people with a personality disorder diagnosis to enable me to perform my role effectively and meaningfully. [] Strongly disagree [] Disagree [] Neutral [] Agree [] Strongly agree
I have the necessary skills in working with people with a personality disorder diagnosis to enable me to perform my role effectively and meaningfully. [] Strongly disagree [] Disagree [] Neutral [] Agree [] Strongly agree
I have the necessary confidence in working with people with a personality disorder diagnosis to enable me to perform my role effectively and meaningfully. [] Strongly disagree [] Disagree [] Neutral [] Agree [] Strongly agree
I have received adequate and appropriate training on working with people with a personality disorder diagnosis. [] Strongly disagree [] Disagree [] Neutral [] Agree [] Strongly agree
Please rate the quality of the current training you have received from the service in relation to working with people with a personality disorder diagnosis. [] Unacceptable [] Needs improvement [] Meets training needs [] Exceeded training needs [] Outstanding [] No training received
Section 5: Service Improvement *The final section asks for ideas for how service practice related to personality disorder might be updated or improved. Please respond to the questions below using the text entry options*. **In your opinion…**
What is going well with how the service supports people with a personality disorder diagnosis?
What is not going well with how the service supports people with a personality disorder diagnosis?
What could the service do to improve how it supports people with a personality disorder diagnosis?
What training would be helpful in supporting the service to improve its practice in this area?

Appendix F Service improvement recommendation excerpts from questionnaire respondents

"More wards dedicated to having PD patients together".
Improve access to "small groups for group therapy. Small groups where PD patients were together have been effective".
"Offer more training, led by users by experience".
"Train staff adequately".
"Change the language staff use" to describe PD.
Help staff to "feel more motivated to work with high complexities" through training.
Increase "knowledge about the services that exist for personality disorders, and the pathway to accessing these".
"Provide equal opportunities".
"Bring a focus on trauma-informed case discussions to all units and properly evaluate them."
"Work with supported accommodation providers to upskill them."
Improving connections between services might mean "PD patients are not waiting as long for [community] accommodation to be found".
"Better community support".
"Encourage and prolong discharge".
"Support for staff teams who are charged with supporting such individuals".
"More focus on trauma awareness".
"More joint training with service users".
"Give staff better understanding of PD and how to support those with it".
"Better staffing and training".
"More trauma informed work".
"Give more training to staff".
"E-learning can often go in one ear and out the other with the busy wards".
"Staff need specific time to ask questions".
"Be more assertive regarding whether patients are suitable for the service".

Appendix G Focus group steering questions

1. Some staff feel that people with personality disorders might be cared for differently than people without a personality disorder diagnosis within the service. What do you think and why might this be?
2. Some staff feel that more training is needed to help them improve their skills in this area. In your opinion, what should this training include?
3. When thinking about personality disorders, do you tend to think of them as separate categories, like different boxes to put people in, or more as a series of personality traits that we all share to varying degrees?
4. In your view, how might staff attitudes or beliefs about personality disorders influence the care they provide?
5. What ways could the service improve its practice with supporting people who have a personality disorder diagnosis?

Appendix H Correlation matrix between self-report outcome measures for facial palsy and control groups

	1	2	3	4	5	6	7	8	9	10
	Facial Palsy Group									
1. DASS21 Depression	-	.691**	-.318**	-.355**	-.074	.018	-.026	.248*	-.190	-.202
2. DASS21 Anxiety	.691**	-	-.093	-.239*	.028	.283**	.095	.333**	-.119	-.030
3. BESAA-A	-.318**	-.093	-	.255*	-.094	.038	-.212	.046	.320**	.395**
4. ACIPS Total	-.355**	-.239*	.255*	-	.115	.305**	.172	.094	.360**	.355**
5. IRI Perspective Taking	-.074	.028	-.094	.115	-	.266*	.455**	-.164	-.099	-.102
6. IRI Fantasy	.018	.283**	.038	.305**	.266*	-	.361**	.171	.086	.095
7. IRI Empathic Concern	-.026	.095	-.212	.172	.455**	.361**	-	-.172	-.042	-.058
8. IRI Personal Distress	.248*	.333**	.046	.094	-.164	.171	-.172	-	-.059	.052
9. VAS Unpleasant-Pleasant	-.190	-.119	.320**	.360**	-.099	.086	-.042	-.059	-	.736**
10. VAS Not Exciting-Exciting	-.202	-.030	.395**	.355**	-.102	.095	-.058	.052	.736**	-
	Control Group									
1. DASS21 Depression	-	.615**	-.441**	-.399**	-.179	.170	-.065	.264*	-.245*	-.116
2. DASS21 Anxiety	.615**	-	-.414**	-.425**	-.139	.144	-.137	.258*	-.294*	-.142
3. BESAA-A	-.441**	-.414**	-	.286**	.239*	-.119	.040	-.124	.305**	.143
4. ACIPS Total	-.399**	-.425**	.286**	-	.328**	.090	.269*	-.128	.366**	.407**
5. IRI Perspective Taking	-.179	-.139	.239*	.328**	-	.132	.660**	-.031	.331**	.230*
6. IRI Fantasy	.170	.144	-.119	.090	.132	-	.337**	.329**	-.061	-.071
7. IRI Empathic Concern	-.065	-.137	.040	.269*	.660**	.337**	-	-.083	.132	.260*
8. IRI Personal Distress	.264*	.258*	-.124	-.128	-.031	.329**	-.083	-	-.009	.068
9. VAS Unpleasant-Pleasant	-.245*	-.294**	.305**	.366**	.331**	-.061	.132	-.009	-	.628**
10. VAS Not Exciting-Exciting	-.116	-.142	.143	.407**	.230*	-.071	.260*	.068	.628**	-

*= significant at p =.05; **= significant at p=.01; all values r^s

Appendix I Joint working statement

Aspects of this project were completed jointly with Chloe Hiles, Trainee Clinical Psychologist. At the project development stage, it was agreed with the Senior Research Team on the Oxford Doctorate in Clinical Psychology that trainees should work together on some aspects of the project, namely the development of a joint ethics application (CUREC) which captured the overlapping and separate methodologies employed in both projects (e.g., self-report measures used), the preparation of shared study materials (e.g., information sheet), and participant recruitment (e.g., advertising research and participant contact). The decision to work together on these aspects of the project was made because individuals with facial palsy are considered a hard-to-reach clinical group, and therefore it was felt appropriate to take a joint approach to maximise enrolment and reduce participant burden. It was contracted that both trainees would have different theoretical justifications for their proposed projects, different research questions, and different methodological approaches (e.g., interpersonal pleasure versus social anxiety; mimicry versus suppression). Data analysis and write-up were carried out entirely independently. The implications and boundaries of joint working were discussed, agreed to, and contracted, prior to the start of the research cycle. Co-authorship on manuscript publication has been agreed to as recognition of these separate and joint contributions.