Hearing Attitudes: Tone of Voice and Its Effects on Listeners' Wellbeing and Disclosure

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A thesis submitted for the degree of Doctor of Philosophy in Psychology

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Date of submission for examination September 2025

Date of submission for final thesis March 2026

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Acknowledgement

In the name of God, The Most Compassionate and The Most Merciful

Firstly, I would like to thank God for showering me with an abundance of blessings, continuous strengths through faith, perseverance during trying times, and provisions from ways I could have never imagined. This PhD thesis is the epitome of *"the journey is the destination".*

Secondly, to my sponsor, Majlis Amanah Rakyat Malaysia (MARA) who sponsored my four-years of PhD journey (2021-2025) in the United Kingdom. I wouldn't have come to the UK if I was not a fully sponsored PhD.

Special thanks to my internal and external examiners: Dr Wijnand van Tilburg and Prof Geoff Haddock (University of Reading) for reading my whole thesis and providing constructive feedback. I really enjoyed the engaging discussion during my 3-hour viva which felt like time flied really quick.

Thirdly, my heartfelt appreciation and indebted gratitude to the most amazing, supportive supervisor I could have asked for. I'm glad I made the right choice coming to Essex to work with Prof Silke Paulmann, even when I had a simultaneous offer from another university. Essex feels more tight-knit, smaller, kind of like a family. Under Silke's mentorship, I evolved from a timid foreign student to an early career researcher who is more confident and passionate about research. My PhD wouldn't have

completed without the support of my co-supervisors, Dr Veronica Lamarche and Prof Netta Weinstein (Reading), who offered valuable insights from their areas of expertise. Not to forget the psychology technical support team (Steve Fowles, Tai, Woakil, and all team members), PGR administrators (Karen, Trudi) and academic staffs (chair panel: Eva, Rick, Gjisbert) in the psychology department who have assisted and supported me throughout my PhD. Also, the PGRE team who approved all the PhD processes, and organised different events for PGRs to make sure we feel inclusive and supported.

Fourth, although I never asked permission to study abroad and just proceed with it after I received a sponsorship, I know it was hard on my family to let me embark on a journey to fulfil my dream – alone and abroad. I wouldn't be where I am today, had it not been for the early, high-quality education put forth by my high-achieving (used-to-be strict) dad; and mom, who always makes sure we are well-fed and cooks delicious food for the family, a love language for most Asian moms. To my sister, who regularly checks up on me to make sure I'm still alive, and my brother, who recently started his own family. My family may never verbalise it, but I'm assuming they are proud of me: the first child who studied abroad for her PhD.

Finally, to all my PhD cohort from CBS Level 4 room: Drs Khetam, Celia, Charli, Ola, Lily; my PhD mom friends soon-to-be Dr Siri and Dr Magda; my kindred spirit in this life and the next and soon-to-be lawyer in Norway Saredo Osman; my ISOC PhD friends soon-to-be Dr Esra, Dr Farah; Chelsea, colleagues who I have had the pleasure to work with at the Library and Outreach team. Special thanks to the Skills for Success team, particularly SK038 instructors (Jack, Rachel, Sarah, Emily, Fay, and Mick), who commented and provided feedback on my writing and the engaging weekly discussion

we have among PGRs. Not to forget, Kent J, for motivating me and supporting me, even before my master's degree, telling me that I'm worth so much more (in his own way) with having postgraduate credentials.

Every single person I have crossed path in this life – those who remained, including those who left – have their own role in shaping this whole journey called: *(PhD) Life*.

While a PhD might just be another degree to some, this PhD is the life-changing experience I needed to re-affirm my values and choose my path, even if it's one less travelled.

All praises belong to God, The Most High and The Most Wise.

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Abstract

This thesis investigates how speakers' vocal expressions shape listeners' affective and behavioural responses across interpersonal, workplace, and cross-cultural contexts. Specifically, it addresses three key research questions. First, how might a speaker's interested-sounding voice elicit listeners' disclosure and wellbeing differently than an uninterested-sounding voice, and how do these outcomes vary across cultures? (Chapter 2). Second, do differing voice patterns influence work commitment, state of wellbeing, and flourishing among listeners? (Chapter 3). Third, what psychological impacts, disclosure responses, and affective states arise when listeners are exposed to varying voice patterns across real-life contexts? (Chapter 4). The overarching aim of this thesis is to examine how the nuances of vocal tone (beyond the semantic language) affect relational dynamics, emotional states, and behavioural outcomes. Employing both experimental and cross-cultural methodologies, the studies provide empirical evidence that vocal tone not only communicates affect but also carries the power to shape disclosure, wellbeing, and commitment in diverse settings.

Keywords: tone of voice, wellbeing, self-disclosure, attitudinal prosody, motivation

CHAPTER 1

INTRODUCTION

1.1 The Voice is an Information Fountain

Communication is a big part of our daily activities. We talk and communicate with someone every day, presenting ideas and thoughts. Within communication, there are the verbal or linguistic (word choice, language used) and the non-verbal or paralinguistic features (facial expression, body language, tone of voice). We know that communication is important as part of social interactions, but how well do we know the elements that constitute communication? One major element in communication is the voice, particularly the tone of the voice.

Tone of voice is a non-verbal, paralinguistic feature. Paralinguistics, from the Greek meaning “alongside language” refers to sounds that convey meaning without being part of the language system itself (Abrams, 2020). The tone of voice is often summarised as “not what was said, but *how* it was said”, which can be ambiguous; thus, voice is typically interpreted through the surrounding context (Abrams, 2020). In the mechanism of tone of voice, there are the words uttered (semantics) through the voice and the modulation or how the voice utters the words (prosody). Prosody is an umbrella term that encompasses the various ways in which speakers modulate their voice to convey meaning beyond the literal words they use. Prosody includes elements such as pitch, intonation, rhythm, stress, loudness, and voice quality (Bergmann, 2018), collectively forming the nonverbal layers of spoken communication. In the context of this thesis,

prosody is used interchangeably with “tone of voice,” as both refer to the paralinguistic features of the voice.

The voice is not just a tool of communication. In fact, the voice holds a wealth of information about the speaker. A comprehensive review by (Guyer et al., 2021) highlights that the human voice provides insights on the speaker extending far beyond the emotions expressed. Listeners use vocal cues to infer a speaker’s traits, social intentions, situational appraisal (Fraccaro et al., 2011; Gregory & Webster, 1996; Guyer et al., 2019; Hughes et al., 2010; Leongómez et al., 2014; Pisanski et al., 2018; Pisanski & Bryant, 2019; Puts et al., 2006) and demographic characteristics such as age, sex, and social status (Cheng et al., 2016; Ko et al., 2015). Vocal features also provide insights into personality, such as pleasantness (Zuckerman & Miyake, 1993), competence (Kreiman & Sidtis, 2011), benevolence (Brown et al., 1973), honesty, and anxiety (Bond et al., 1987), as well as authority showing power (Sorokowski et al., 2019), dominance, and strength (Pisanski & Bryant, 2019; Puts et al., 2006), credibility (Chebat et al., 2007), persuasiveness (Van Zant & Berger, 2020), attractiveness (Babel et al., 2014), and attitude (Scherer, 1988). Apart from extracting information about the speaker through the voice, research by Simon-Thomas et al. (2009) found that listeners are capable of detecting fine nuances in voice, for example, distinguishing anger from fear and sadness or awe from compassion, interest, and embarrassment. This evidence suggests that not only does voice convey a wealth of information, but it also carries distinct and specific emotions that are very distinct to the listener.

Another key component of auditory communication is the way speakers modulate their voice through different vocal cues. They can vary pitch by speaking in a high or low

voice; adjust loudness by speaking softly or loudly; or change their tempo by speaking faster or slower. They can also alter the so-called quality of their voice, making it sound rough, shrill, nasal, strident, or smooth (Kreiman et al., 2003). As part of this, the way our voice is used can have an effect on others' behaviour. This is evidenced by a study on social word-of-mouth showing that the tone of voice in marketing messages can significantly shape consumer responses (De et al., 2017). The study further notes that positive messages delivered in a factual tone tend to have a stronger impact on attitudes, purchase intentions, and positive word-of-mouth than emotionally toned messages, though this effect also depends on the type of service being evaluated. This suggests that the choice of vocal tone in customer engagement can directly affect brand perception and effectiveness, with empirical evidence on the power of tone of voice on listeners' behavioural intention (e.g., whether to purchase a product).

Throughout the remainder of this chapter, to set the stage on the power, relevance, and influence of tone of voice – the central theme of this thesis, this chapter systematically reviews past relevant research, from foundational work and the decoding of vocal messages to the social functions of voice and emerging trends in prosody, before outlining the theoretical and conceptual frameworks, operationalisation, and the impetus for the current research.

1.2 Past Relevant Work: The Missing Piece

Extensive research over the past decades has examined prosody primarily in emotional prosody. Emotional prosody refers to the vocal expression of basic emotions, such as happiness, sadness, anger, and fear (Banse & Scherer, 1996; Pell, Paulmann, et al., 2009; Sauter et al., 2010), which is often studied using actors speaking natural or

pseudo-sentences (sentences that do not make sense). Classic work in this domain by Scherer (Scherer, 1986) laid the foundation for understanding how vocal cues reliably signal emotional states, and many subsequent research thereon (e.g: Laukka et al., 2016; Paulmann et al., 2008; Zhao et al., 2018) have identified the acoustic correlations of these emotions, including pitch variability, speech rate, and intensity. Most prior research has focused on how emotions are conveyed through vocal cues, yet emotions themselves fall into different families that are often clustered together and, at times, used interchangeably with attitudes or behavioural intentions. For example, sounding polite through the voice could be categorised as an emotion (Kamiloğlu et al., 2020; Mitchell & Ross, 2013), falling within the emotion family of prosocial positive emotion, but politeness can also be considered more of an attitude rather than an emotion. Similarly, interest can be categorised within the emotion family of epistemological (defined as emotions involved in changes in individuals' knowledge about the world) (Kamiloğlu et al., 2020; Simon-Thomas et al., 2009), but interest could be defined as an attitude shown toward something or someone that piques one's curiosity but commonly grouped as an emotion (Silvia, 2008). Thus, fuzzy boundaries and researcher-biased conceptualisation may have driven the strong emphasis on vocal emotional expression (i.e., emotional prosody), while research on "attitudes" conveyed through the voice remained comparatively underexplored and, to an extent, quite neglected.

Attitudinal prosody refers to the speaker's intentions, attitudes, or social dispositions conveyed through their tone of voice (Mitchell & Ross, 2013), rather than the emotion being expressed. Over a decade ago, Mitchell and Ross (2013) published a review on what is already known within the attitudinal prosody field and recommended

suggestions for future directions. Twelve years later, little progress has been made: voice research continues to centre largely on basic emotions, with attitudes remaining a peripheral concern. The authors provided conceptual arguments in making the distinction between emotions and attitudes, given the common overlapping grouping of attitudes as emotions in prosody literature. Emotions, for example, are involuntary affective expressions that tend to be intense and arise in response to significant events. Attitudes, in contrast, are more enduring, reflect affectively charged beliefs or predispositions, and are typically less intense as well as more socially and culturally regulated than emotions. Further to this, attitudinal prosody is explicitly defined as *a disposition toward or against a particular phenomenon, person or object, i.e., the interpersonal stance conveyed by the speaker* (Mitchell & Ross, 2013; see Pell, 2006). Building on this review of attitudinal prosody, the present thesis adopts this definition to describe attitudes conveyed through the voice. For instance, a speaker may sound interested, friendly, condescending, or encouraging, regardless of whether they are emotionally happy or sad.

Although the study of attitudinal prosody remains underexplored, existing research still points to the promise of prosody more broadly. Influential work by Paulmann and colleagues (Vrijders, et al., 2018; Paulmann & Weinstein, 2023) has extended the concept of prosody into motivational contexts, demonstrating that the motivational voice, particularly a controlling-sounding voice, can directly shape listeners' intentions, attitudes, and behavioural responses. Thus, the distinction between attitudinal prosody and emotional prosody is critical as the aforementioned evidence demonstrates how attitudinal cues often guide social behaviour and influence relational outcomes. Even with these advances, most research still emphasises either emotional recognition (see recent

research: Elfenbein et al., 2022; Gürses et al., 2025; Larrouy-Maestri et al., 2024) or broad personality judgments (such as confidence; Jiang & Pell, 2017; Scherer et al., 1973). This gap is further compounded by interdisciplinary norms. Research in linguistics, psychology, communication, and even clinical medicine approaches prosody from different angles, often with inconsistent terminology and operationalisation (see Bąk, 2016; Mitchell & Ross, 2013). This inconsistency in definition and theories may have limited the ability to form a cohesive understanding of how attitudinal prosody functions in everyday interactions.

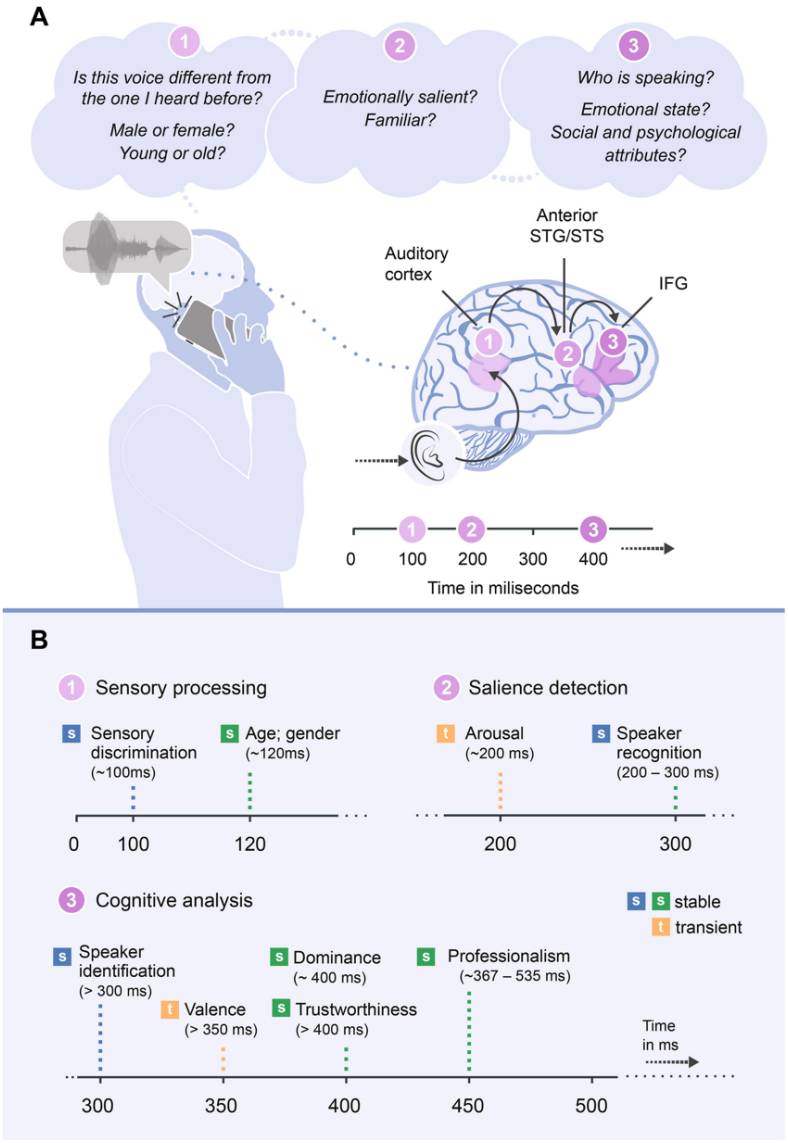
Collectively, while the field of emotional prosody has established that much can be conveyed through tone of voice, attitudinal prosody research impacting the listeners is still lacking. Across different fields, including psychology and communication research, the findings consistently demonstrate that voice changes can influence listeners' behaviours (Barcelos et al., 2018; Weinstein et al., 2019), suggesting that listeners are highly attuned to the subtleties of vocal expression.

Therefore, the current thesis addresses these limitations by focusing specifically on attitudinal prosody and its effects on listener outcomes. By systematically examining how different vocal patterns, such as interest, praise, encouragement, or criticism, shape listeners' behaviour, this research aims to fill a critical missing piece in the voice literature. From this point onward, the term prosody will therefore consistently refer to tone of voice, as a paralinguistic cue conveying speakers' attitudes and intentions, laying the foundation for a detailed exploration of its social and psychological impact.

1.3 How do Listeners Decode Information from the Speaker's Voice?

To understand the full processing sequence of when a speaker speaks and listeners decode the wealth of information from the voice, it is crucial to examine how and when listeners extract this information from the voice. Listeners infer information about the speaker, specifically rapid extraction of emotional details within a 200-ms window (Paulmann et al., 2008; Paulmann & Kotz, 2008), and form stable trait impressions within 400ms of exposure to the voice (Mileva & Lavan, 2023). However, a more recent discovery found that listeners perceived the physical characteristics of the speaker (such as gender and age) as early as 120 ms, whereas the psychological and social characteristics (such as educational background) are decoded from around 360 ms onwards (Lavan et al., 2024). To better visualise this rapid inferencing process, Figure 1 below illustrates the timeline from initial exposure to the voice (figure from Pinheiro, 2025).

Figure 1 Rapid Decoding of Vocal Information by Listeners (Pinheiro, 2025)



In the original figure (Pinheiro, 2025), the upper panel (A) illustrates the three stages of vocal expression analysis and their neural correlations with cortical brain regions, while the lower panel (B) depicts the evolution of brain responses reflecting the activation of representations related to emotion, identity, and personal characteristics. Given that the voice conveys a wealth of information about the speaker, the extraction of this information occurs rapidly, typically within under one second, as illustrated in the figure.

A model that further explains how listeners perceive messages from a speaker is the modified Brunswikian lens model (Scherer et al., 2002). This model distinguishes between the *encoding* of emotion by the speaker, in other words, the transmission of the vocal signal, and the *decoding* by the listener, which ultimately results in emotional inference or attribution. According to Scherer, vocal characteristics in emotional speech are shaped by both push and pull effects: push effects arise from physiological changes linked to emotional responses that directly influence the voice, while pull effects reflect strategic or socially guided regulation of vocal expression, in which speech is consciously or conventionally modulated for communicative purposes. This framework elucidates that decoding is not a passive act, as listeners actively interpret and integrate multiple vocal features to understand the speaker's emotional state and social intention through the voice.

Moreover, as voice is a paralinguistic cue, listeners rely heavily on the prosodic parameters of the voice for information. Research on vocal emotion recognition using pseudo-utterances shows that listeners can identify discrete emotions with accuracy significantly above chance; in other words, listeners perform better than random guessing, indicating that they are able to detect vocal cues reliably (e.g., Pell et al., 2009; Scherer et al., 2001). Accuracy levels remain comparable whether the material consists of semantically neutral sentences or entirely meaningless pseudo-sentences (e.g. Castro et al., 2010), indicating that the recognition and perception are based on vocal cues rather than linguistic content (Lausen & Hammerschmidt, 2020). These findings suggest that the human ear can reliably extract emotional meaning from voice alone, thus highlighting the

power of prosodic (i.e., paralinguistic features) alone in shaping listeners' interpretations, even in the absence of semantic information or when the sentence does not make sense.

Furthermore, to evaluate the validity of listeners' perception of the voice, a study on open-ended judgments of listeners' perceptions asked participants to rate voices freely in their own words, rather than selecting from pre-determined voice characteristics. The findings indicate that listeners perceive far more than just emotions in a voice, with judgments emerging from expressive vocal cues (Elfenbein et al., 2022). Although this approach has limitations, such as listeners may not always rate accurately depending on individuals' vocabulary or the overlap emotions like happiness and joy, the findings further emphasise that listeners can rate and decode a wide range of information simultaneously, highlighting that tone of voice is a multi-layered signal that subtly shapes how listeners interpret information from the voice.

In sum, this super swift process by which listeners decode information from the voice provides a strong rationale for examining how attitudinal prosody has an effect (either a positive or a negative effect) on the listeners during social interactions, given how listeners infer about the speaker in less than a minute.

1.4 Attitudinal Voice Patterns in Social Interactions

With the growing interest in attitudinal prosody, even if the term "attitudinal prosody" is not always explicitly used, there have been studies examining voices showing specific attitudes. For instance, a confident voice has been studied substantially, revealing that confident statements are characterised by a lower mean pitch and faster speaking rate compared to unconfident statements (Jiang & Pell, 2014), supported by other research reporting that the paralinguistic cues of confidence is expressed through increased

loudness, rapid speech rate, infrequent short pauses, and under certain conditions by greater pitch and energy fluctuations (Scherer et al., 1973). Interestingly, higher-pitched voices, while sometimes signalling lower confidence, have been associated with financial trustworthiness (Guyer et al., 2021).

In other attitudinal-related research, an increase in vocal effort (e.g., energy in high-frequency bands) was linked to the perception of being more sociable and possibly extroverted. Speakers who project confidence while maintaining perceived sincerity in communication often speak louder and adjust their volume strategically to facilitate persuasion (Zant et al., 2019). In a data-driven study, speakers' dishonesty and uncertainty (i.e., perceived as unreliable) are judged when they pronounce words with a rising intonation, less intensity at the beginning of the word, a slower speech rate, and more variable pitch and speech rate (Goupil et al., 2021). Finally, an empathetic voice has also been shown to enhance interpersonal relationships, even with a conversational agent, demonstrating that nonverbal vocal cues can shape listeners' perception of the speaker (Kim et al., 2020).

Collectively, these studies on attitudinal prosody characterise the acoustic profiles of different voices but do not examine how these vocal cues influence listeners' behaviour. To address this gap and extend the literature, the current research investigates five voice patterns that, to our knowledge, have not been empirically studied: interest, friendliness, praise, condescension, encouragement, and critical tones of voice. The motivations for selecting these specific voice patterns are discussed below.

Showing an interest through the voice

Some studies categorise *interest* as a positive emotion or into the emotion family of epistemological (Elfenbein et al., 2022; Kamiloğlu et al., 2021; Simon-Thomas et al., 2009), defined as states that accompany shifts in understanding of or knowledge about the world. Literature of interest stems from the motivation field (Ainley et al., 2002). Silvia (2001) defines interest as aspects of motivation, emotion, and personality, or in other words, a transient affective state. The author argues that interest is a *curious emotion* that functions to motivate learning and exploration (Silvia, 2008), which over time builds knowledge and competence (Silvia, 2006) and that once people understand something that was once new and complex, it is not interesting anymore. Thus, interest is an ideal category to test as it can both be classified as emotion (c.f. Silvia, 2001), but can also be argued to fit the definition of an attitude or social prosody more broadly (Mitchell & Ross, 2013). For example, when a speaker uses an interested-sounding voice, the goal is to signal interest to the listener (and, for comparison, an uninterested-sounding voice conveys the opposite), rather than to communicate the emotion of interest itself.

Being friendly in relationships and during services

Friendliness is context-dependent. In service-related roles with frequent customer interaction, communicating friendliness is essential. For example, visually impaired students reported that librarians' friendly behaviour conveyed a sense of acceptance, value, care, and welcome, indirectly fostering a sense of belonging (Bodaghi et al., 2017). Similarly, another study with a similar population of visually impaired students revealed that librarians' greetings and friendly conversations, particularly from their tone of voice, reflected librarians' empathy for the visually impaired students (Bodaghi et al., 2016).

While these studies underscore the importance of tone of voice for students with visual disabilities, they do not examine how a friendly tone might affect listeners' wellbeing. In addition, in an adolescent peer-rating study, voices were perceived as friendlier when speakers used faster speech rates and more assertive response strategies in hypothetical social interactions involving a peer being mean. However, this study did not investigate the impact of friendly attitudinal prosody on listeners themselves (Nault et al., 2024). The current thesis, therefore, investigates the friendly tone of voice (compared with unfriendly tones to assess opposing effects on listeners) across six different social interactions, including a librarian context, to examine how vocal cues influence listeners' wellbeing.

Favourable and detrimental tones at work

While studies have demonstrated the importance of effective workplace communication (Buenviaje et al., 2016; Rajhans, 2009), they have largely overlooked non-verbal behaviours, particularly tone of voice.

Two vocal patterns hypothesised to produce positive outcomes in the workplace are praising and encouraging tones of voice. To assess their opposing effects, praising will be compared with condescending voices, and encouraging with critical voices. Praising was selected based on evidence that verbal praise can yield favourable outcomes. For example, a study with music students found that receiving praise for effort, rather than talent, enhanced attitudes toward task persistence (Droe, 2013), a finding supported by research showing that teachers' praise increased on-task behaviour and reduced disruptions (Markelz & Taylor, 2016). These results suggest that the benefits of praising extend beyond educational settings, motivating an investigation of the praising tone of voice in workplace contexts.

Furthermore, condescension, an example of workplace incivility, has been shown to increase psychological distress (Cortina et al., 2001). This raises the question of whether a condescending tone of voice might produce a similar impact on listeners' wellbeing. Another attitudinal prosody warranting investigation is the critical tone of voice, examined relative to encouraging tones, as research indicates that destructive criticism can lower goal setting and diminish self-efficacy in students (Baron, 1988).

Although it may seem intuitive, no research has yet examined how modulating tone of voice through these various vocal patterns could foster employees' motivation, or, on the contrary, contribute to negative effects. The current thesis provides empirical evidence on how praising, condescending, encouraging, and critical tones of voice affect employees' wellbeing and work commitment. As with an interesting-sounding voice, when speakers praise or encourage through their voice, it is operationalised as a behavioural intention rather than as an emotion. Moreover, by comparing opposing tones delivered using the same sentence, this research highlights a key insight: it is not the content of a message alone that influences listeners, but the tone in which it is delivered.

Teacher's autonomy-supportive voice

Finally, building on pioneering studies of autonomy-supportive voices (Vrijders et al., 2024; Weinstein et al., 2018, 2019) and recent research on autonomy-support in education (Paulmann & Weinstein, 2023), this thesis examines teachers' autonomy-supportive voices in naturalistic settings, specifically during one-on-one sessions with a student. By using recordings from real classroom interactions, rather than acted voices typically employed in voice research, this approach provides rich insights into how teachers' vocal cues influence students' disclosure.

In sum, these previously underexplored voice patterns offer a deeper understanding of how subtle vocal cues across different social contexts can influence listeners. While related literature can inform hypotheses (e.g., praise has been shown to increase task persistence), empirical investigation is needed to directly examine the effects of speakers' tone of voice on listeners, with a particular focus on their self-disclosure and wellbeing.

1.5 Prosody and Self-Disclosure

Over the past decade, self-disclosure has attracted interest from researchers across diverse fields. Studies have examined topics such as gender differences in self-disclosure (Derlega et al., 1985; Dindia & Allen, 1992; He et al., 2021); online self-disclosure across different social media platforms (Chang & Heo, 2014; Kim & Dindia, 2016; Koohikamali et al., 2017; Walsh et al., 2020); reciprocity in disclosure (Collins & Miller, 1994); and self-disclosure in the context of critical illness (Zhang et al., 2021). These studies illustrate the wide range of topics and contexts explored within self-disclosure research.

Although extensive research has examined self-disclosure in clinical settings (Anvari et al., 2021; Hill et al., 2018), interpersonal relationships such as couples (Quek & Fitzpatrick, 2013), friendships (Davis, 2012), as well as interactions with strangers (Dubois et al., 2016), little is known about how tone-of-voice characteristics, such as low or high pitch or other vocal qualities, shape self-disclosure in diverse social contexts. This gap highlights the need for research examining the influence of vocal cues on listeners' willingness to disclose personal information.

Focusing on self-disclosure is warranted because it plays a central role in helping people bond, collaborate, and build trust (Ryan et al., 2016). Confiding in others and forming close bonds for social support has been shown to reduce depression and anxiety, improve self-rated health (Peters, 2008), and decrease loneliness (Stokes, 1987). Beyond promoting wellbeing through authenticity (Jourard, 1971), self-disclosure is also linked to fostering mutually responsive and close relationships (Laurenceau et al., 1998). Greater openness in sharing distressing information is associated with improved mental health (Ward et al., 2007), and individuals who engage in reciprocal self-disclosure demonstrate higher prosocial behaviour (Song et al., 2016). Recent evidence further suggests that non-verbal behaviours, including vocal cues, influence self-disclosure when listening (Weinstein et al., 2021). These findings highlight that subtle communicative behaviours, such as tone of voice, may have a powerful effect on whether and how individuals choose to disclose personal information. It is therefore crucial to understand the link between tone of voice and self-disclosure, given the positive outcomes of disclosure for the individual in both personal and professional contexts.

To date, no empirical study has directly examined how speakers' tone of voice influences listeners' disclosure. However, adjacent research offers useful insights into how vocal patterns might encourage disclosure and shape listeners' preferences for certain voices. For example, Anolli and Ciceri (2002) investigated men's speech when attempting to seduce potential female partners. Acoustic analyses of sentences in which men asked women if they would like to meet again revealed increased pitch, loudness, and faster speech rates compared to baseline speech patterns. The authors suggested that higher-pitched voices are perceived as signalling warmth, affection, and likability,

which may encourage self-disclosure within a mutually trusting relationship, although disclosure itself was not directly measured. Similar conclusions were drawn by Montepare and Zebrowitz-McArthur (1987), who noted that higher-pitched voices are generally associated with perceptions of warmth.

The current thesis will methodically measure the prosodic characteristics to identify which voice patterns could facilitate the act of self-disclosing. The results are expected to provide valuable guidance for professionals who regularly interact with others in contexts where sharing personal experiences is essential, such as therapy sessions.

1.6 Prosody and Wellbeing

Beyond self-disclosure, it is also important to examine the impact of vocal patterns on listeners' wellbeing. Given the wealth of information conveyed through the human voice, expanding research on how speakers' vocal cues influence listeners' affective states is crucial, as these states in turn shape social interactions. Evidence from professional contexts illustrates this effect: Fata and Aluş Tokat (2022) found that nurses who used an appropriate tone, moderated speech pace, and clear language enhanced patients' comfort and communication in an infertility clinic. Similarly, Carpentier and Mageau (2013) reported that coaches who provided feedback with a "considerate" tone (e.g., avoiding yelling) fostered athletes' wellbeing, motivation, and self-esteem. Although the aforementioned research did not specify the exact acoustic cues underlying "appropriate" or "considerate" voice uses, the report highlighted that raised pitch or yelling acted as barriers for patients to connect with the nurses and for athletes to experience better wellbeing.

Outside professional contexts, research demonstrates that the human voice carries a social presence that written or text-based communication cannot replicate. Field and lab studies indicate that voice-based interactions (via phone, video, or voice chat) strengthen social bonds and promote positive affect, whereas text-based channels are less effective (Kumar & Epley, 2021; Liang et al., 2024). These findings suggest that vocal nuances, including intonation and expressiveness through the voice, could facilitate relational closeness that is absent in text-based interaction. It could also be argued that, unlike text, which lacks auditory cues, the voice projects warmth, a multidimensional construct encompassing intimacy and attachment, similar to the feeling of connection with nature (Andersen & Guerrero, 1996), but could equally be present in the human voice, thus, highlighting the unique social and emotional impact of the speaker's voice on the listener.

Furthermore, removing the influence of other non-verbal cues, such as facial expressions, has shown beneficial outcomes to the listeners. For instance, a series of five studies testing whether voice-only communication increases empathy accuracy over communication across senses found that voice-only communication enhanced empathic accuracy relative to vision-only and multi-sense communication (Kraus, 2017). This happened while engaged in interactions with strangers. Particularly, in two of the studies, the researcher found that voice-only communication could have enhanced empathic accuracy due to listeners' increasingly focused attention on the linguistic and paralinguistic vocal cues that accompany speech. Thus, this evidence points that in the absence of other non-verbal cues (e.g., facial expression) and listeners could only hear

the voice, all attention is directed to the information from the voice, which indirectly increases listeners' empathy.

Mast and Hall (2018) further argued that recognising the emotional content (or intention) of nonverbal behaviour is essential for real-world outcomes, as perceiving emotions through conversation has been shown to enhance daily wellbeing. Even a single communicative interaction with a friend in a day can improve daily wellbeing (Hall et al., 2025). More recently, Paulmann and Weinstein (2023) demonstrated that hearing autonomy-supportive voices increased satisfaction of autonomy and relatedness needs, indirectly enhancing wellbeing, and intention to cooperate and self-disclose. This is supported by Mukherjee (2017) on the importance of positive interpersonal communication to enhance wellbeing, which can be achieved by being a good communicator, with one of the suggested characteristics being to use a calming tone of voice.

On the other hand, difficulties in decoding emotional meanings from non-verbal cues, such as tone of voice, have been linked to poorer relationship wellbeing, a pattern that can be exacerbated among depressed individuals (Carton et al., 1999). Together, these findings consolidate the importance of further testing on vocal patterns, particularly positive-valence tones of voice (compared to negative-valenced tones for contrast) in shaping listeners' wellbeing across different contexts and even cultural settings.

Thus far, we have established that the voice carries information that listeners actively decode during interaction. Mehrabian (1968) defined immediacy as the extent to which communication behaviours such as non-verbal interaction enhance closeness, supported by other research on the importance of social connectedness for human health

and wellbeing (Jordan, 2023). Wellbeing that promotes both physical and mental health emerges through social closeness, which begins with “we” (Kok & Fredrickson, 2013), that is, through the involvement of at least two people. In the context of the current thesis, the focus is on how speakers’ modulation of tone of voice could contribute to listeners’ wellbeing, or, on the contrary, their ill-being.

1.7 Trends in Prosody

It is worth noting briefly here that the power of the voice is not limited to carrying emotions, attitudes or intentions. Apart from the traditional prosody studies on emotions, AI-generated speech has become increasingly prominent in prosody research over the past few years, particularly using voice as a parameter to determine emotional and physical health (Abdelal, 2012). Several important, to an extent, groundbreaking findings have emerged in neurological and mental health through voice analysis. For example, Silva et al. (2024) revealed that acoustic parameters such as jitter (perturbation) and CPPS can predict depression, offering an additional diagnostic tool. Voice analysis has also detected Parkinson’s disease with 95.9% accuracy in women and 94.36% accuracy in men, improving on previous detection methods (Shen et al., 2025; Solana-Lavalle & Rosas-Romero, 2021; Swain et al., 2024). Another study extracted features from the vowel /a/ and achieved 94% accuracy in predicting blood pressure using machine learning methods (Ankışhan, 2020). These clinical examples illustrate that the voice carries rich, diagnostic information; however, they do not diminish the importance of studying voices in social contexts.

In fact, research with children has shown that human voices are rated as more pleasant and easier to understand than synthetic voices (Dylman et al., 2025). Positive

prosody and human voices improved listening comprehension, highlighting how natural vocal expression enhances understanding and engagement. This suggests that natural, positive vocal qualities may foster more socially rewarding interactions.

Although the current thesis does not incorporate AI-assisted models, these aforementioned studies represent emerging fields in voice research. Mentioning these trends demonstrates the richness of vocal information and shows how prosody research bridges social, psychological, and biomedical domains, while simultaneously emphasising the need for more empirically based studies examining how varying vocal patterns shape human social interactions.

1.8 Theoretical Framework

This thesis draws upon three complementary theories to guide the formulation of the research questions and the design of the studies. These frameworks collectively inform the hypothesised relationship between tone of voice, self-disclosure, and listeners' wellbeing.

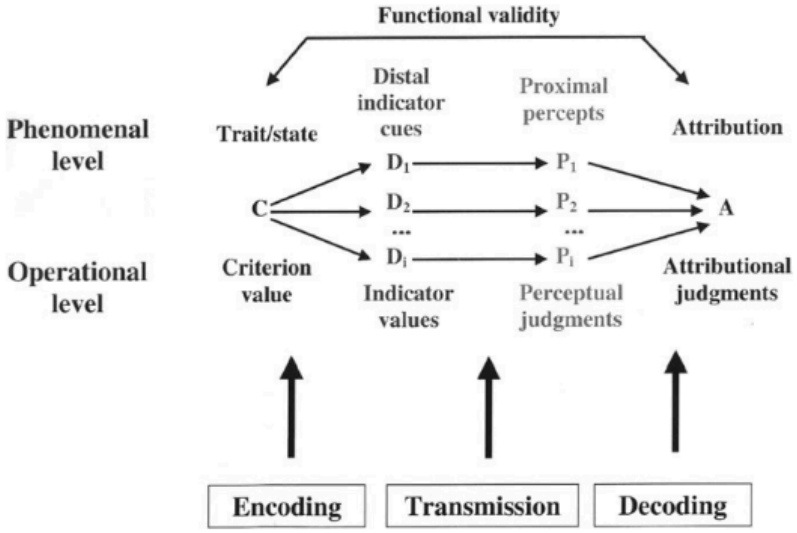
Tone of Voice

Adopting the Brunswikian lens model, briefly explained earlier, builds the foundation to describe the mechanism starting from when the speaker communicates through the voice and the listener receives the message verbally. Scherer extended Brunswik's lens model, a central perspective in prosody research, to describe the process by which speakers encode messages in their voice and listeners decode these messages. The Brunswikian model conceptualises communication as a two-step process: the speaker encodes intentions, emotions, and attitudes into vocal cues, and the

listener interprets these cues to infer meaning, affect, and motivational states. Within this framework, *push effects* describe how internal states can influence the vocal signal, while *pull effects* capture how speakers regulate their tone to align with social or contextual demands. In the present thesis, the emphasis is on attitudinal prosody: speakers encode their attitudes in tone of voice (e.g., encouragement, praise, interest), and listeners decode these tones, which in turn shape their affective states (such as feeling supported or dismissed) and behavioural outcomes (such as willingness to disclose or engage). By examining these encoding and decoding processes, the thesis extends the Brunswikian perspective beyond emotional expression to demonstrate how attitudinal intentions in the voice influence wellbeing and interaction across different contexts.

Additionally, by examining various voice patterns, the current thesis investigates how subtle vocal cues carry social intentions, support relational motivation, and shape perceptions of the speaker. This perspective allows for a nuanced understanding of voice as a multi-layered communication tool that is not merely intentional but relational and action-oriented. The model explains that the process starts with the speaker encoding emotional states through measurable voice and speech characteristics, which reflect physiological changes linked to emotional arousal (Scherer, 1986). These acoustic changes, called distal cues, are transmitted in the speech signal and perceived by the listener as proximal cues, allowing the listener to infer the speaker's emotional state. The figure below shows the full-end process based on the expanded Brunswikian model.

Figure 2 Modified Brunswikian lens model in speaker-listener voice perception (Scherer et al., 2002)



Self-Disclosure

Social Penetration Theory proposes that relational closeness develops as individuals gradually share personal information across layers of intimacy (Altman & Taylor, 1973; Carpenter & Greene, 2015). Within the context of this thesis, self-disclosure serves as a key outcome influenced by vocal cues. By integrating this theory, the research considers not just whether listeners share information, but how different voice patterns may encourage or discourage disclosure. This approach recognises that the decision to self-disclose is affected by subtle social signals, including interest conveyed in the speaker's voice, allowing a direct link between vocal behaviour and interpersonal engagement.

Wellbeing

Relational Motivation Theory is a sub-theory derived from the Self-Determination Theory (SDT). Relatedness (feeling of closeness to another person, e.g. how related listeners feel to the speaker), apart from autonomy. It highlights the importance of motivational

theory in shaping wellbeing outcomes, as evidenced in motivational prosody research (Paulmann et al., 2018). RMT suggests that social interactions are inherently motivated by the desire to maintain and enhance relationships, and that relational experiences directly influence affective states (‘Relationships Motivation Theory’, 2023).

For this thesis, RMT provides the framework to interpret how listeners’ wellbeing is affected by the quality of relational cues in a speaker’s voice. Interested-sounding voices, for instance, may enhance a listener’s sense of relatedness and thus promote positive affect, whereas uninterested voices may reduce closeness to the speaker. Integrating RMT within attitudinal prosody allows this research to connect behavioural and affective outcomes to underlying psychological needs, offering insight into the mechanisms through which voice shapes social and emotional experiences.

1.9 Conceptual Framework

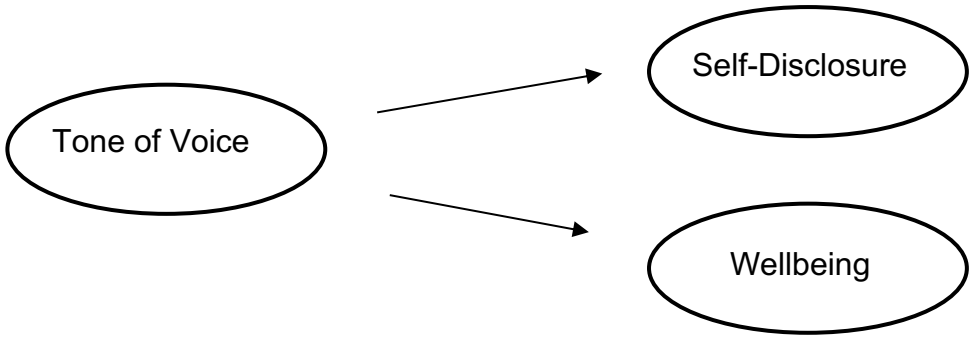
Integrating the three theoretical frameworks, a conceptual framework is developed to explain how variations in speakers’ vocal patterns influence listeners’ responses. The Brunswikian model provides the foundation by describing the encoding-decoding process in vocal communication. Speakers embed intention and attitude into their voice, which listeners decode to infer meaning and relational cues.

Social Penetration Theory complements this framework by providing a structure to understand self-disclosure as a relational outcome. Disclosure is a dynamic process where individuals reveal personal information progressively, building intimacy and trust. Applying this theory allows the thesis to conceptualise why variations in tone may encourage or inhibit listeners’ willingness to share, highlighting the psychological and interpersonal relevance of vocal cues beyond basic emotional recognition.

Relational Motivation Theory (RMT) offers insight into how voice patterns influence listeners' wellbeing. Specifically, the relatedness component of RMT addresses the quality of social connection and interpersonal closeness experienced by listeners. By linking vocal cues to relational outcomes, this framework explains why praising voice may foster positive affect, enhance perceived connection, and promote flourishing.

Taken together, these three theoretical perspectives form the backbone of the conceptual framework for this thesis. The hypothesised relationships conceptualised that speakers' voice patterns directly influence listeners' self-disclosure and wellbeing. The conceptual model is illustrated in Figure 3, showing direct relationships from vocal patterns to both disclosure and wellbeing outcomes, grounded in theory and supported by prior empirical evidence.

Figure 3 Hypothesised Relationship between Tone of Voice Patterns (Predictor) and Self-Disclosure and Wellbeing (Outcomes of Interest)



1.10 Empirical Studies

1.10.1 Tone of Voice

In my thesis, four acoustic parameters of interest to analyse speakers' voices are selected. The four parameters will inform the characteristics of the speakers' voices,

impacting the outcomes of interest. Specifically, fundamental frequency or pitch, speech rate, CPP and LTAS will be used.

Voice is commonly measured through acoustic parameters, which reflect specific characteristics of speech. Prosody studies have used different acoustic parameters in determining the voice characteristics. For the current thesis, four primary acoustic parameters were selected to capture the features of speakers' voices that could influence listeners' self-disclosure and wellbeing: fundamental frequency (pitch), speech rate, Cepstral Peak Prominence (CPP), and Long-Term Average Spectrum (LTAS). The definition and signification of the four selected parameters used throughout the thesis are explicitly defined below.

Pitch

Pitch represents the highness or lowness of a speaker's voice and is measured as the mean fundamental frequency across sentences. Women typically have a higher pitch than men (Pisanski et al., 2018). Pitch provides critical information about emotional expression, confidence, and social signalling. Prior prosody research consistently identifies pitch as the most informative acoustic feature in conveying vocal emotion and listener perception (Aung et al., 2024; Aung & Puts, 2020a; Jin & Park, 2023; O'Connor, 2024). Fundamental frequency is measured in Hz (see Maltezou-Papastylianou et al., 2025).

Speech rate

Speech rate quantifies how fast or slow a speaker delivers utterances. It is calculated as the duration of spoken sentences divided by the number of syllables or words. Speech rate has been linked to perceptions of confidence, engagement, and motivation, and is frequently used in applied settings such as vocal communication within organisations (De Waele et al., 2019; Guyer et al., 2019), with speaking in a slower rate being preferable boosts customer satisfaction and leads communicators to be perceived more positively (Cascio Rizzo & Berger, 2025).

Cepstral Peak Prominence (CPP)

CPP reflects the harmonic organisation of the voice, indicating voice quality and clarity. It has been widely used in studies assessing vocal health and emotional expression, for instance, in clinical contexts such as depression detection (Silva et al., 2024). CPP is commonly measured in dB measurement units (see Maltezou-Papastylianou et al., 2025).

Long Term Average Spectrum (LTAS)

LTAS captures the spectral energy distribution across the entire speech sample, providing insight into the overall voice quality, timbre, and variability. LTAS has been applied in studies of emotion recognition, vocal identity, and social perception (Leino, 2009; Peng et al., 2023). LTAS is commonly measured in dB measurement units (see Maltezou-Papastylianou et al., 2025).

All acoustic parameters were extracted using AudioLab or PRAAT software, generating quantitative measures that allow direct comparisons across different voice conditions. These parameters provide the foundation for linking vocal characteristics to listeners' responses in subsequent analyses (Banse & Scherer, 1996).

1.10.2 Self-Disclosure

One novel contribution of this thesis is examining the effect of vocal patterns on self-disclosure. Self-disclosure is operationalised using Linguistic Inquiry and Word Count (LIWC-2022)**,** a validated, robust text-analysis software that categorises words into psychological domains, including affective, cognitive, social, and self-referential dimensions (Boyd et al., 2022; Tausczik & Pennebaker, 2009). The software counts the number of words in the text and uses a list of dictionary words that are categorised into domains such as affect, linguistic, social, and pronouns, among others. In this thesis, selected LIWC measures capture both the quantity and quality of disclosure. Table 1 below shows the selected LIWC measures used throughout the studies.

Table 1 Selected LIWC dimensions

Disclosure Dimension	***Definition/Significance***	***References***
Word Count	The frequency of words during the disclosure process, indicative of verbal fluency and talkativeness	(see Houghton & Joinson, 2012)
Analytic	Metric of logical, formal thinking; reflects logical thinking	(Pennebaker et al., 2014; Tan et al., 2021)
Authentic	Reflect disclosure authenticity	(Newman et al., 2003; Tan et al., 2021)
Affect	Reflecting sentiment, rather than emotion per se; reflect the degree of immersion	(Tausczik & Pennebaker, 2009)
Function	Convey *how* people are communicating (rather than the content of the words e.g.: nouns or verbs); attentional allocation (where the attention of the speaker is: current or past) and how the speaker is processing the situation	(Tausczik & Pennebaker, 2009)

Tone	Reflect emotional valence	(Cohn et al., 2004; Tan et al., 2021)
Linguistic	Reflect the overall language comprehension and style used in disclosure	(Tausczik & Pennebaker, 2009)
Pronouns	Reflect social hierarchy; Signify the speakers' focus of attention	(see Kacewicz et al., 2014)

In addition, *Tones* and *Emotions* (positive and negative) are sub-categories within the *Affect* dimension.

1.10.3 Wellbeing

Wellbeing outcomes in this thesis are conceptualised through the lens of Self-Determination Theory (SDT), specifically focusing on the needs for autonomy and relatedness, which are central to Relational Motivation Theory (RMT) (Deci & Ryan, 1987; Ryan & Deci, 2000, 2017). Attitudinal behaviour created through voice (e.g., sounding interested, praising) is expected to differentially impact listeners' emotional and relational experiences.

Throughout the whole thesis, wellbeing is the constant outcome for all empirical studies. Depending on the research question and the context of interest (e.g., workplace or healthcare settings), wellbeing was assessed using a combination of validated instruments: the Positive and Negative Affect Schedule (PANAS) for affective states, part of the flourishing PERMA scale, work commitment scales, and NHS-adapted items for

emotional and social wellbeing. These instruments provide a comprehensive evaluation of participants' affective and motivational states, aligning with the theoretical framework linking voice to relational and emotional outcomes.

In sum, the operationalisation of the predictors (tone of voice) and outcomes (self-disclosure and wellbeing) enables the current thesis to empirically examine how subtle variations in vocal patterns influence listeners' social and emotional responses. Acoustic analyses quantify the characteristics of speakers' voices, LIWC measures capture the depth and quality of verbal disclosure, and standardised wellbeing assessments evaluate affective and relational outcomes. Together, these measures provide a rigorous foundation for testing the research questions.

1.11 Impetus for Current Research

Several reasons warrant the necessity for the current thesis.

First, numerous studies on prosody are review articles (Guyer et al., 2021; Kamiloğlu et al., 2020; Mitchell & Ross, 2013; Scherer & Bänziger, 2004) or theoretical (Patel et al., 2011; Scherer, 1985, 2006, 2015) in nature, highlighting the ongoing need for rigorous, empirical, and experimental research to strengthen the evidence base. Voice research has increasingly shifted toward artificial intelligence applications for identifying diseases and health risks. While these technological advances are important, they do not address the role of voice in everyday social interactions, which has become increasingly relevant as people use voice-based communication more frequently, particularly during and since the global changes in social behaviour following the 2020 pandemic (Liang et al., 2024).

Second, an inconsistent methodological approach in developing the voice stimuli. Many past studies relied on professional actors to produce emotional vocalisations, potentially introducing exaggeration in expression that might differ from natural speech (Wagner & Windmann, 2016; Wang et al., 2011). The current thesis addresses this inconsistency for all studies by employing non-professional actors whose vocal expressions resemble the natural variability of everyday conversation. This approach ensures that findings are more ecologically valid and applicable to real-world social interactions.

Third, existing conceptual or theoretical research also lacks attention to the link between voice and listener outcomes, particularly behavioural responses such as disclosure and affective states such as wellbeing.

Fourth, with the slow shift in the study of attitudinal and motivational prosody, the current thesis contributes empirical evidence from studies in various applied settings in attitudinal prosody. Moreover, six different vocal patterns, depicting attitudinal intentions (such as sounding encouraging or critical), are examined.

Finally, the predominance of English-speaking, monolingual participants restricts the cross-cultural applicability of prior research (Bąk, 2016). To address this gap, the current thesis examines how interested-sounding versus uninterested-sounding voices from speakers of diverse cultural backgrounds influence listeners' self-disclosure and situational wellbeing.

Research Questions

Building on these gaps, the current thesis will address three research questions:

RQ 1: How might a speaker's interested-sounding voice elicit listeners' disclosure and wellbeing differently than an uninterested-sounding voice? How do these outcomes differ across cultures? (Chapter 2)

RQ 2: Do differing voice patterns influence work commitment, state of wellbeing, and flourishing among listeners? (Chapter 3)

RQ 3: What psychological impacts, disclosure responses, and affective states arise when listeners are exposed to varying voice patterns across real-life contexts? (Chapter 4)

The overarching aim of this thesis is to examine how speakers' vocal expressions shape listeners' affective and behavioural responses. Notably, each chapter is written in a publication format; thus, certain foundational concepts, such as the rich information carried by the human voice, may be repeated for context.

In summary, drawing from past and recent literature across various fields, including psychology, communication, and linguistics, it is evident that the voice is more than just a tool for communication. Not only does tone of voice carry a wealth of information, but it also holds the power to influence listeners. To gain a deeper understanding of the nuances of tone, a series of nine systematic studies exploring different vocal patterns and their effects on listeners is expected to contribute substantially to the underexplored and often neglected field of attitudinal prosody. Moreover, providing insights into how tone of

voice can shape listeners' self-disclosure and wellbeing offers new evidence in the literature, with practical implications for professional and personal contexts, demonstrating how modulating the voice wisely could foster better relationships, improve work culture, and enhance overall wellbeing.

> We often refuse to accept an idea merely because the tone of voice in which it has been expressed is unsympathetic to us."
> (Friedrich Nietzsche (1844–1900); from Guyer et al., 2021)

CHAPTER 2

THE SOUND OF INTEREST ON LISTENERS' DISCLOSURE AND WELLBEING

Background

The objective of this chapter is to focus on one key vocal pattern, specifically, interested (in relative to uninterested) voices and their effects on listeners' self-disclosure and wellbeing. This series of studies examines listeners' affective states and behavioural responses across different cultures. Study 1 investigates the effects of American and British speakers on listeners' outcomes, and Study 2 examines the effects of Chinese and Indian speakers on their respective listeners. Study 3 takes a cross-cultural approach, testing the effects of speech by Indian and British speakers on both Indian and British listeners. The focus of this chapter is to dive deeper into the impact of showing interest (and disinterest) through the voice and how these effects transcend cultural boundaries. An internal mini meta-analysis is conducted at the end of the chapter to highlight internal consistency in differences between interested and disinterested voices across the three studies.

This chapter is written in preparation for submission to a publication.
Keywords: tone of voice, wellbeing, self-disclosure, interested voices, cross-cultural

Showing an Interest in Others Through Vocal Cues - Evidence For A Three-Factor Social Facilitator Model

Most of us have experienced that awkward moment: you're at a social gathering, meeting someone new, and just as you begin explaining what you do for a living, you notice their eyes glazing over. Despite their polite nodding, their body language tells a different story - one of clear disengagement. This common social interaction illustrates a broader phenomenon in human communication, where subtle cues of attention and disinterest shape our interpersonal interactions. The sense that one's conversation partner does not have a genuine interest in what we have to say crosses many of life's domains, including in doctor's practices, interviews, parent-child interactions, business meetings.

Conveying *interest* is powerful but may be subtle, communicated not only in what is said but also in the tone of voice used by interlocutors. During social interactions, speakers have a large repertoire of vocal cues at their disposal. They can speak in a high or low voice (perceived as differences in pitch), in a loud or soft manner (perceived as differences in loudness), or by varying their tempo to be fast or slow (speech rate). Speakers can also alter the so-called quality of their voice: does their voice sound rough, shrill, nasal, strident, or smooth? Collectively, these cues can reveal much information about a speaker's state of mind (e.g., are they happy, sad, bored) and there is ample evidence that listeners use these voice cues to form impressions about speakers (see e.g., Kreiman & Sidtis, 2011, for an overview).

It is likely that vocal cues can set the "tone" for a conversation. Crucially, thin-slice approaches (Ambady & Rosenthal, 1997; Carney et al., 2007) that present participants

with short excerpts of someone's speech have consistently revealed that listeners need very little information to form state or trait impressions about others, which then affect their downstream social behaviours during the conversation.

The current research set out to investigate the power of voice by exploring its potential to act as a social facilitator. Specifically, we focused on interested tones used by speakers as meaningful predictors of listeners' experiences within a conversation.

The Power of Voice: How The Way We Speak Affects Listeners

It has long been recognized that speakers modulate voice cues to convey different social intentions, most prominently studied in the context of communicating emotional states through voice cues (Grandjean et al., 2006; Paulmann et al., 2008; Pell et al., 2009). Specific acoustic profiles associated with "basic" emotions (e.g. anger, fear, happiness, sadness) are well described in the emotional voice literature (Banse & Scherer, 1996; Paulmann et al., 2008; Pell et al., 2009), but other social signals, such as motivations (Paulmann et al., 2018; Weinstein et al., 2018) and attitudes (Jiang & Pell, 2015; Mitchell & Ross, 2013; Wickens & Perry, 2015) have also been linked to specific acoustic cue combinations that listeners use to interpret speakers' intention.

Next to characterising vocal profiles, some research investigates what downstream effects expressing specific social intentions has on listeners. Specifically, there is accumulating experimental evidence which suggests that listeners adapt their responses or planned behaviour depending on how a speaker communicates, providing initial evidence that tone of voice can act as a facilitator in social interactions. For example, Weinstein et al. (2018) showed that listening to an autonomy-supportive tone (one that provides listeners with a sense of choice in an interaction; as opposed to a

controlling tone that pressures and coerces) predicted greater emotional wellbeing and pro-social behaviour intention. Related work showed that listening to autonomy-supportive voices enhanced listeners' intention to put in effort into tasks and intention to cooperate with the speaker (Paulmann & Weinstein, 2023; Weinstein et al., 2019). These effects have been found for different age groups (e.g., university students; adolescents, toddlers) and in different contexts including teaching (Paulmann & Weinstein, 2023; Weinstein et al., 2018) and parenting (Weinstein et al., 2019). More recent evidence showed that emotional (happy vs. angry) voices can have similar wellbeing effects on listeners, suggesting that the intention to motivate the listener is not the driving factor behind effects. Rather, it seems that creating a positive communication climate is beneficial for listeners (e.g., more positive affect experienced by listeners after listening to someone speak in a positive voice; Hanel & Paulmann, 2025).

Additional evidence for voice cues influencing the quality and effectiveness of social interactions comes from studies using qualitative methods. For example, nurses who used a positively valenced tone (not too high pitched), adjusted the pace of their speech, and who chose understandable words, improved female patients' communication with nurses at an infertility clinic (Fata & Aluş Tokat, 2022). In other contexts, athletes report greater self-esteem, more autonomous motivation, and lower negativity (Carpentier & Mageau, 2013) when they were provided with feedback from their coach using a "considerate" tone of voice (voice is not raised; free of yelling). Finally, visually impaired visitors feel more included at libraries when librarians display empathy through warm greetings, friendly conversation, and soft-sounding voices (Bodaghi et al., 2016). Collectively, raised pitch and volume were seen as barriers for patients to connect with

nurses, for athletes to experience better wellbeing, and for visually impaired to feel welcome in libraries, highlighting the potential to employ different vocal strategies to promote social interactions.

Showing an Interest Through Vocal Cues: Facilitating Social Interactions

Building on the observation that different ways of speaking can have profound effects on listeners, the current investigation set out to test for these effects in a previously underexplored voice context, namely when “showing an interest”, or said another way, conveying that one has a sense of curiosity, desire to learn more about, and explore together with (Silvia, 2005) their conversation partner.

Perceiving others as taking an interest has been shown to be impactful on speakers in a number of key contexts. For example, a patient describing supportive healthcare conversations remarked, “When the nurse makes eye contact and makes me feel that she is listening to me, I can feel comfortable” (Fata & Aluş Tokat, 2022). Similarly, DiCicco-Bloom & DiCicco-Bloom (2016) report that “respectful interactions”, that is, those that signal confidence, honesty, and appreciation, increase information sharing between health care professionals and thereby influence patients’ care. In addition, experimental research testing listening with conversations indicates that feeling listened to (including through showing an interest) reduces social anxiety and can increase self-esteem (Itzchakov et al., 2022; Itzchakov & Weinstein, 2021). Also, expressing an interest in close others can enhance social bonds through increasing the feeling of intimacy within a relationship, an effect that has been observed in romantic relationships (Ohtsubo & Tamada, 2016) and parent relationships (Weinstein et al., 2019, 2021). In short, experimental and qualitative work have recognised that signalling interest in others can

provide social support by enhancing the psychosocial health of listeners, but the impact of vocal cues on this process has not yet been directly studied.

Alongside improving psychosocial health, showing an interest may also influence listeners' response behaviour. For example, Hargie et al. (2004) have postulated that effective team communication benefits from *adequate* tone of voice usage to signal whether the speaker is interested in the response. Thompson (1995) further described that rising or falling tone of voice when asking simple questions can either invite a reply or fail to do so, suggesting that voice cues can be used to create the impression that the speaker is interested in the answer, the speaker already knows the answer, or that the speaker does not want to know the answer.

One important context in which interest may be particularly impactful is when engaging in self-disclosure, or sharing personal information (Antaki et al., 2005). This may be the case for a few reasons. First, reciprocal self-disclosure enables vital turn-taking in conversations (Sprecher et al., 2013). Second, when listeners perceive genuine interest and are encouraged to self-disclose, it helps them bond, collaborate, and build trust (Laurenceau et al., 1998; Levi-Belz & Kreiner, 2016; Marino et al., 2016). Third, people are often reluctant or unwilling to self-disclose, especially when talking to strangers, because they worry the other person will dislike them or enjoy the conversation (Sandstrom & Boothby, 2020) and because they expect norms of reciprocal sharing will be violated (Gouldner, 1960; Sprecher et al., 2013; Whatley et al., 1999). It is thus important to investigate if vocal cues that can assuage fears about a listener's response – such as whether or not one's conversation actually cares about the content that is self-disclosed.

Present Research

Prosody is key but understudied in the area of social communication. Showing an interest through voice cues is likely to impact speakers within a conversation. Research has found that speakers using soft (vs. harsh) voices can create an environment in which listeners feel closer to and more valued by speakers (e.g., Paulmann & Weinstein, 2023; Weinstein et al., 2020). Similarly, listeners experiencing happy (vs. angry) sounding voices report enhanced perceived closeness and autonomy (Hanel & Paulmann, 2025), suggesting that the way speakers express ideas or ask questions can influence the context in which interactions take place (e.g., positively vs. negatively framed). Additionally, past work has also highlighted that signalling an interest in another's thoughts, feelings, or experiences through other non-verbal cues (e.g., attentive listening, body language) validates listeners' sense of autonomy.

Building on findings reported, this current study aims to show how the way we speak can act as a social facilitator through a three-pronged approach. Specifically, across three studies, we test how tone of voice, here operationalised as showing an interest or not, can a) provide support during interactions, b) influence response behaviour, and c) can modify the context in which interactions occur. Understanding how voice cues can act as a social facilitator when speakers communicate with someone they do not know well can have important implications across a range of domains (e.g., work, education or health care contexts). We set out to test three hypotheses:

Hypothesis 1: Voices can provide social context. Speakers' interested-sounding voices (vs uninterested voices) will increase perceived closeness towards and anticipated responsiveness from the speaker.

Hypothesis 2: Voices can provide social support. Listening to interested-sounding voices (vs uninterested voices) will increase intention to help the speaker and will lead to enhanced satisfaction with oneself after the conversation.

Hypothesis 3: Voices provide social influence. Voice cues that convey interest will be perceived as encouraging to share differently with the speaker (e.g., share more words, share more affectively using informal linguistic style, share using enhanced analytical words).

Ethics

Ethical approval was obtained via the Ethics Subcommittee-3 of the University of Essex (ETH2122-2178).

General Design

Studies 1 and 2 applied a between-subjects design presenting interested and uninterested voices to two different listener groups. In Study 3, a within-subject design was employed, whereby each listener was presented with materials spoken in both voice conditions and from both in- and out-group speakers.

Methods

Participants. No sample group screening was employed. Data were collected from 150 participants, with 75 listeners assigned to each voice condition (interested/uninterested). The final number of participants after data cleaning was 137 (interested = 69 (37 women, 2 non-binary), uninterested = 68 (33 women, 1 non-binary, 1 did not want to disclose). A sensitivity power analysis conducted in G*Power indicated that with N = 137, the study had 80% power to detect effects of approximately f = .24, corresponding to a small-to-medium effect size. Participants were predominantly white (~80%), with Asian (~10%), Black (~5%), and mixed ethnic groups (~5%) making up the rest of the sample. Participant ages ranged from 19-73 years (*M* = 38.12, *SD* = 13.19). Participants who did not follow instructions and those who did not pass the audio check questions were removed.

Experimental Stimuli. Two voice conditions, an "interested-sounding voice" and an "uninterested-sounding voice", were created. Four native English speakers (one male and one female American, and one male and one female British; all below 50 years) were asked to produce materials. Before recording the two conditions, they were told that an *interested-sounding tone of voice* demonstrates warmth and shows a strong interest and excitement towards the listeners to make them feel understood, listened to, and cared for, whereas an *uninterested-sounding tone of voice* shows no interest in prolonging the conversation, making listeners feel uncared for, and the speakers asked out of necessity. Speakers spoke eight questions from the Relationship Closeness Induction Task (RCIT; Sedikides et al., 1999; e.g., "What is one thing about yourself that most people would consider surprising?"; "What is one habit you'd like to break and why?") in an interested-

sounding and an uninterested-sounding voice. To validate whether naive listeners would be able to detect the social intention of speakers, materials were validated in an initial rating study. Thirty listeners (15 males and 15 females) rated the combined voices of all four speakers for interested-sounding voices and uninterested-sounding voices, consecutively. The results confirmed that the interested-sounding voices were perceived as sounding engaged (M = 5.67, SD = 1.12), curious (M = 5.43, SD = 1.22), inquisitive (M = 5.40, SD = 1.13), interested (M = 5.37, SD = 1.07) while the uninterested-sounding voices were perceived as sounding bored (M = 5.03, SD = 2.11) and judgmental (M = 3.80, SD = 2.04) confirming that independent listeners were able to detect expected differences in the way the questions were spoken. A detailed summary of the paired sample t-test is shown in the table below.

Table 2 Stimuli Validation (English speakers)

Rating	***Condition***	
	Interested-sounding voice	***Uninterested-sounding voice***
Interested	M = 5.37 SD = 1.07	M = 2.77 SD = 1.79
	t(29) = 6.91, *p* < .001, *d* = 1.26	
Engaged	M = 5.67 SD = 1.12	M = 2.63 SD = 1.61
	t(29) = 8.73, *p* < .001, *d* = 1.59	
Curious	M = 5.43 SD = 1.22	M = 2.90 SD = 1.67
	t(29) = 8.08, *p* < .001, *d* = 1.48	
Inquisitive	M = 5.40 SD = 1.13	M = 2.93 SD = 1.76

	$t(29) = 7.22$, $p < .001$, $d = 1.32$	
Warm	M = 5.03 SD = 1.35	M = 2.77 SD = 1.70
	$t(29) = 6.11$, $p < .001$, $d = 1.12$	
Friendly	M = 5.23 SD = 1.25	M = 2.87 SD = 1.83
	$t(29) = 6.15$, $p < .001$, $d = 1.12$	
Bored	M = 1.73 SD = 1.11	M = 5.03 SD = 2.11
	$t(29) = -8.28$, $p < .001$, $d = -1.51$	
Judgmental	M = 2.23 SD = 1.78	M = 3.80 SD = 2.04
	$t(29) = -4.03$, $p < .001$, $d = -.74$	

Procedure. Participants were recruited using Prolific, an online participant recruitment platform. Participants were invited to participate in a study on tone of voice. After reading general instructions and providing consent, they reported on their gender, ethnicity, age, and profession. We then asked participants to check their audio to ensure that they were able to listen to the voice materials. Each participant listened to eight questions (two questions from each of the four speakers) in total. They first heard a question (e.g., “Tell me, what are your hobbies?”) and were subsequently asked to spend one to two minutes providing a written answer in a response box. Next, participants could replay the question before they first rated characteristics of the voice (listed below) they had just heard (manipulation check), followed by responding to survey items outlined next.

Perceived closeness and anticipated responsiveness. Following past work (e.g., Paulmann & Weinstein, 2023), we used the relationship domain-specific basic

psychological need satisfaction scale (La Guardia et al., 2000) to test how connected participants felt to the speaker and how responsive they anticipated the speaker would be to their reply. To assess perceived closeness, participants were asked, “How much do you feel like you could trust the speaker?”, “How close did you feel to the speaker?”, “How much did you feel like the speaker really cared for you?” after listening to the questions of the speaker. To assess how much listeners anticipated that speakers anticipated their personal needs and values (Weinstein et al., 2016), the following items were used: “How much did you feel that the speaker really valued your opinions and abilities”, “How much did you feel free to express your thoughts and emotions”, “How much did you feel that the speaker really understood how you felt?”. Internal reliability was high for both perceived closeness (α = .938), and anticipated responsiveness (α = .935).

Intention to help. Participants’ willingness to help the speaker was assessed with one item: (α = .850) ‘How much would you want to help/assist the speaker if they asked for your help?’. [Note: Cronbach’s alpha was calculated across participants’ responses to the four different speaker stimuli within each condition.]

Conversational satisfaction. Participants’ satisfaction with themselves after the interaction was assessed with the item: “How satisfied did you feel with yourself after answering the request?” (α = .884).

Self-disclosure. To test for differences in self-disclosure between conditions, we analysed data using the Linguistic Inquiry and Word Count (LIWC; Boyd et al., 2022)

software. Nine variables that were previously used to assess the depth of self-disclosure (Tan et al., 2021; Tausczik & Pennebaker, 2009) were chosen for analysis: *Analytical Thinking* (reflected in complex sentence structures and logical reasoning and associated with greater listener engagement and more detailed self-disclosure), *Authentic Communication* (reflection of how much a participant was socially cautious/inhibited their response reflection of perceived honesty and genuineness in their responses), *Tone of Disclosure* (how positive/negative the disclosure is valenced), *Linguistic Style* (reflection of the overall language comprehension and style used in disclosure), *Affect Communication* (reflection of the sentiment of the person and the degree of immersion and emotionality), *Function Words* (reflection of the style and mode of communication such as high usage of function words signal the use of formal language, while low usage of function words may indicate a more casual conversational style), *Verbs* (reflect temporal focus of attention signalling priorities, intentions and processing), and *Pronouns* used (reflect social hierarchy and how an individual is referencing those in the interaction and outside of the interaction).

Results

Table 3 Acoustic characteristics of the four speakers in the interested and uninterested-sounding voice conditions

Voice condition	***Interested-sounding***			***Uninterested-sounding***		
Speakers	***Male***	***Female***	***All***	***Male***	***Female***	***All***
F0 mean (Hz)	146.86	218.72	182.79	125.17	148.62	136.90
Mean intensity (dB)	68.72	70.81	69.77	68.46	69.34	68.90
Speech rate (seconds)	4.25	3.87	4.06	3.50	3.33	3.41
Mean LTAS (dB)	0.86	-2.86	-1.00	-0.88	-5.47	-3.18
LTAS local peak height (dB)	1.71	2.74	2.22	0.66	-1.10	-0.22
CPP (dB)	27.71	27.67	27.69	30.43	27.48	28.95

Note. For interested and uninterested-sounding voices, the means of extracted measures were averaged across speakers. Speech rate was calculated using the number of syllables in an utterance and dividing this by the utterance in duration (in seconds), meaning that speech rate is expressed in syllables per second (following Weinstein et al., 2020).

Analysis of the acoustic measures of the four speakers revealed distinct differences between interested and uninterested voice conditions. Compared to uninterested voices, interested voices are characterised by a higher mean fundamental frequency (perceived as pitch) and a faster speech rate. Mean intensity did not differ substantially between conditions. Spectral measures indicated that interested voices showed greater energy in higher frequencies, reflected in a higher LTAS mean and local peak height. Taken together, these findings suggest that an interested tone of voice is primarily conveyed through higher pitch, quicker speech rate, and brighter spectral quality, rather than through increased loudness.

Manipulation check. To ensure that the voices expressed were perceived in the intended way, participants were asked to indicate on a scale from 1 (*not at all*) to 7 (*a great deal*) how "interested" (interested sounding condition) or "bored" (uninterested voice condition) they felt the speaker sounded. For each manipulation measurement, different filler items for each condition (e.g., "young", "informed", "dismissive", "rushed") were added to prevent participants from focusing on our variables of interest. Results confirmed that questions in the *interested voice* condition were perceived as sounding interested (M = 5.52, SD = 1.17) and voices that were expressed with the intention to sound *uninterested* were mostly perceived as sounding bored (M = 4.40, SD = 1.74). To reduce demand characteristics and prevent participants from fixating on the focal construct, additional descriptor items were included in each condition as fillers. These items differed across conditions by design. The remainder of the means and standard deviation for the interested voice condition were young (M = 3.94, SD = 1.27), excited (M = 4.68, SD =

1.06), informed (*M* = 4.19, *SD* = 1.34) and the uninterested voice condition were rushed (*M* = 2.79, *SD* = 1.43), dismissive (*M* = 3.15, *SD* = 1.49), and tired (*M* = 3.85, *SD* = 1.51).

Perceived closeness and anticipated responsiveness. An independent samples t-test compared participant responses across conditions. Listeners reported feeling closer to speakers when they spoke in an interested-sounding voice (*M* = 4.11, *SD* = 1.11), compared to an uninterested (*M* = 3.32, *SD* = .98) sounding voice (*t(*135) = 4.40, *p* <.001, *d* = .75). Listeners reported feeling more valued and their needs supported after speakers asked them questions in an interested-sounding voice (*M* = 4.21, *SD* = 1.02) compared to an uninterested (*M* = 3.63, *SD* = 1.02) sounding voice (*t(*135) = 3.30, *p* <.001, *d* = .56).

Intention to help and conversational satisfaction. Intention to help differed between conditions (*t(*135) = 2.64, *p* = .01, *d* = .45). Specifically, listeners' intention to provide help to the speaker was higher when the speaker used an interested (*M* = 4.72, *SD* = 1.19) vs. uninterested (*M* = 4.17, *SD* = 1.26) sounding voice. Satisfaction with themselves after the conversation did not differ significantly between conditions (*t(*135) = .53, *p* = .60, *d* = .09; interested: *M* = 4.78, *SD* = 1.26; uninterested: *M* = 4.68, *SD* = 1.26).

Self-Disclosure. Results of a series of independent samples t-tests showed no difference between the interested and uninterested voice conditions predicting any of the disclosure variables, except for *analytical thinking* (*t(*135) = -2.98, *p* = .01, *d* = -.51). Results revealed that words linked to increased analytical thinking were used after responding to questions

in uninterested-sounding (*M* = 29.78, *SD* = 17.29) compared to interested-sounding (*M* = 22.06, *SD* = 12.75) condition.

A supplementary MANOVA on the combined LIWC outcomes did not reveal a significant multivariate effect of voice condition (Wilks' Λ = .12, $F(13, 123) = 1.34$, $p = .197$, partial $\eta^2 = .12$). Given this null omnibus result, and because individual LIWC variables were specified *a priori* as theoretically distinct dimensions of disclosure, these outcomes were analysed separately without applying a blanket correction for multiple testing.

Study 1 Discussion

This first study set out to investigate how interested (versus uninterested) sounding voices can impact social context (listeners' feelings of connectedness to the speaker, anticipated responsiveness to needs), social support (intention to help the speaker and satisfaction with themselves after the conversation), as well as social influence (self-disclosure behaviour). In a nutshell, listeners reported feeling closer to the speaker and felt more valued by the speaker when listening to a question posed in an interested-sounding manner compared to answering a question posed with an uninterested-sounding voice. The results also showed that the intention to provide social support can be manipulated through voice cues (an increase in help intention after listening to interested signalling voices); however, this did not significantly affect the listeners' conversation satisfaction.

Contrary to our hypotheses, tone of voice did not consistently influence listeners' style or length of disclosure in the two different voice conditions. The only response differences found suggested differences for analytical thinking behaviour that implied

formal, logical, and hierarchical thinking. When a question was posed in a manner that conveyed genuine interest in the listener, the written responses demonstrated more thoughtful and deliberate consideration. This suggests that the replies were less superficial compared to those given in response to the same question posed in a way that showed no sincere interest in the answer. Overall, findings suggest that showing an interest when asking a question can influence listeners' perceived social context and impact their social support intention. Results are thus in line with work on motivational and emotional voice use (e.g., Paulmann & Weinstein, 2023; Hanel & Paulmann, 2025), and suggest that even more subtly expressed social intentions can provide a similar socially relevant context. The social influence provided through vocal cues expressing interest (or not) seems limited, which is in contrast to past related work (e.g., Paulmann & Weinstein, 2023) where at least the *intention* to self-disclose was higher when listeners were spoken to in autonomy-supportive sounding voice patterns. It is important to acknowledge that the lack of significant findings for these variables may be influenced by the smaller sample size in this study compared to previous research.

Finally, while Study 1 did not employ any sample screening, we noted that the sample tested was predominantly white with English as their first language. To meet calls for more inclusive participant sampling (Roscoe, 2021) and because most tone of voice research relies on western culture samples (see Pell et al., 2009; Scherer et al., 2001 for cross-cultural comparisons), Study 2 aimed to replicate Study 1 results in a non-western culture sample.

Study 2

Study 1 is the first study to date to demonstrate that listening to speakers signalling interest in listeners through voice cue use alone has an effect on basic psychological needs satisfaction and might affect sentence structures used by individuals when they reply to questions which ask them to share information. This is thus novel evidence that demonstrates interest in conversation partners through voice cue use can be employed as an autonomy-supportive strategy during interactions. The findings complement results reported previously, which showed that voices signalling choice through acoustic cues can enhance basic psychological needs satisfaction (e.g., Weinstein et al., 2018). However, this and past evidence have been predominantly focused on western culture samples both as speakers and listeners, and it is unclear whether findings extend to non-western samples. Study 2, therefore, aimed to replicate and extend the findings from Study 1 to a non-western context. While self-determination theory posits universality in terms of basic psychological needs (Ryan & Deci, 2000), it remains to be tested whether vocal autonomy-supportive strategies employed by speakers transcend cultural boundaries. The work on vocal communication of other social signals (e.g., emotions, motivations, attitudes) in different cultures is limited but suggests that many vocal signals share universal features (e.g. emotions); yet, cultural display norms affect vocal communication, too (e.g., Pell et al., 2009; Banse & Scherer, 2000), suggesting that not all social vocal signals are identical and thus warrant further investigation.

Methods

Participants. Recruitment was stratified by nationality (Southeast Asia countries), ethnicity (South Asian and Southeast Asian) and first language (all Southeast Asian

languages). Following Study 1, data were collected from 150 participants, with 75 listeners assigned to each condition. The final number of participants after data cleaning was 141 (interested = 71 (37 women), uninterested = 70 (36 women). Participant ages ranged from 18-53 years (M = 30.23, SD = 7.67). Sensitivity power analysis using G*Power showed that the achieved sample size (N = 141) provided 80% power to detect effects of approximately f = .24.

Procedure. Study 2 followed the same procedures as Study 1, with the exception that the voice materials were spoken by speakers from China and India. Speakers still posed questions in English.

Experimental Voice Materials. For Study 2, four Asian native speakers (one male and one female Chinese, one male and one female Indian; speakers were in their late twenties and thirties) were asked to produce all eight questions in the two voice conditions. As in Study 1, two questions were then selected for each speaker to allow for eight question presentations in the experiment. Again, materials were first validated. Thirty listeners (15 male, 14 female, and 1 non-binary) rated the combined voices of all four speakers in the interested-sounding and uninterested-sounding voice conditions. Results showed that the interested-sounding voices were perceived as engaged (*M* = 5.07, *SD* = 1.41) and friendly (*M* = 5.30, *SD* = 1.12), while the uninterested-sounding voices were perceived as bored (*M* = 4.57, *SD* = 2.18) and passive (*M* = 4.47, *SD* = 1.81). A detailed summary of the paired sample t-test is shown in the table below.

Table 4 Stimuli Validation (Asian speakers)

Rating	***Condition***	
	Interested-sounding voice	***Uninterested-sounding voice***
Engaged	M = 5.07 SD = 1.41	M = 3.17 SD = 1.78
	$t(29) = 5.89$, $p < .001$, $d = 1.07$	
Curious	M = 4.93 SD = 1.51	M = 2.70 SD = 1.60
	$t(29) = 6.89$, $p < .001$, $d = 1.26$	
Warm	M = 5.00 SD = 1.31	M = 2.87 SD = 1.63
	$t(29) = 7.06$, $p < .001$, $d = 1.29$	
Friendly	M = 5.30 SD = 1.12	M = 3.07 SD = 1.91
	$t(29) = 5.98$, $p < .001$, $d = 1.09$	
Bored	M = 2.10 SD = .89	M = 4.57 SD = 2.18
	$t(29) = -5.84$, $p < .001$, $d = -1.07$	
Judgmental	M = 1.90 SD = .96	M = 2.73 SD = 1.64
	$t(29) = -2.82$, $p < .001$, $d = -.51$	
Cold	M = 1.93 SD = 1.11	M = 4.13 SD = 1.91
	$t(29) = -6.17$, $p < .001$, $d = -1.13$	
Passive	M = 2.73 SD = 1.44	M = 4.47 SD = 1.81
	$t(29) = -4.07$, $p < .001$, $d = -.74$	

Results

Table 5 Acoustic characteristics of the four Asian speakers in the interested and uninterested voice conditions

Voice condition	***Interested-sounding***			***Uninterested-sounding***		
Speakers	***Male***	***Female***	***All***	***Male***	***Female***	***All***
F0 mean (Hz)	149.42	270.89	210.15	133.00	209.31	171.15
Mean intensity (dB)	69.58	68.77	69.18	70.46	69.71	70.09
Speech rate (seconds)	3.19	3.05	3.12	3.21	3.11	3.16
Mean LTAS (dB)	-14.76	8.67	-3.04	-14.61	8.57	-3.02
LTAS local peak height (dB)	1.69	-3.10	-0.71	0.13	1.59	0.86
CPP (dB)	30.38	36.57	33.48	31.20	35.74	33.47

Note. For interested and uninterested-sounding voices, the means of extracted measures were averaged across speakers. Speech rate was calculated using the number of syllables in an utterance and dividing this by the utterance in duration (in seconds), meaning that speech rate is expressed in syllables per second.

Analysis of the acoustic measures of the four speakers revealed distinct differences between interested and uninterested voice conditions. Compared to uninterested voices, interested voices are characterised by a higher mean fundamental frequency, a slower speech rate, and lower mean intensity (perceived as loudness). Spectral measures indicated that interested voices showed greater energy in higher frequencies, reflected in a higher LTAS and local peak height. Quite the opposite from the acoustic analysis for the western speakers, these findings for non-western speakers suggest that an interested tone of voice is primarily conveyed through higher pitch, slower speech rate, and reduced spectral quality and loudness.

Manipulation Check. The manipulation check showed that listeners rated the interested-sounding voices as sounding interested (M = 5.07, SD = 1.46), and uninterested-sounding voices were confirmed to sound bored (M = 4.79, SD = 1.56). Similar to Study 2.1, for each manipulation measurement, different filler items for each condition (e.g., “young”, “informed”, “dismissive”, “rushed”) were added to prevent participants from focusing on our variables of interest. Results confirmed that questions in the *interested voice* condition were perceived as sounding interested (M = 5.52, SD = 1.17) and voices that were expressed with the intention to sound *uninterested* were mostly perceived as sounding bored (M = 4.40, SD = 1.74). To reduce demand characteristics and prevent participants from fixating on the focal construct, additional descriptor items were included in each condition as fillers. These items differed across conditions by design. The remainder of the means and standard deviation for the interested voice condition were young (M = 3.94, SD = 1.27), excited (M = 4.68, SD = 1.06), informed (M = 4.19, SD = 1.34) and the

uninterested voice condition were rushed (M = 2.79, SD = 1.43), dismissive (M = 3.15, SD = 1.49), and tired (M = 3.85, SD = 1.51).

Perceived closeness and autonomy. An independent samples t-test compared participant responses across conditions. Listeners reported feeling more autonomy-supported ($t(139) = 5.79$, $p < .001$, $d = .98$) after speakers asked them questions in an interested-sounding voice ($M = 4.65$, $SD = 1.0$) compared to an uninterested-sounding voice ($M = 3.65$, $SD = 1.04$). Listeners also reported feeling closer to speakers ($t(139) = 5.50$, $p < .001$, $d = .93$) when they spoke in an interested-sounding voice ($M = 4.43$, $SD = 1.04$), compared to an uninterested-sounding ($M = 3.48$, $SD = 1.01$) voice.

Intention to help and conversational satisfaction. Condition predicted listeners' intention to provide help to the speaker ($t(139) = 6.14$, $p < .001$, $d = 1.04$; interested: $M = 5.30$, $SD = .96$; uninterested: $M = 4.15$, $SD = 1.24$) and their satisfaction with themselves after the conversation ($t(139) = 5.39$, $p < .001$, $d = .91$; interested: $M = 5.33$, $SD = .97$; uninterested: $M = 4.28$, $SD = 1.32$).

Self-disclosure. Independent samples t-tests for the nine variables testing for LIWC differences revealed no significant differences between conditions. Results are summarised in Table 6.

Table 6 The Effects of Voice Condition on LIWC Self-Disclosure Dimensions for Studies 1 and 2

LIWC	***Study 1: English sample***	***Study 2: Asian sample***

	Interested-sounding voices	***Uninterested-sounding voices***	***Interested-sounding voices***	***Uninterested-sounding voices***
Word count	M = 309.39 SD = 139.03	M = 282.34 SD = 125.02	M = 281.86 SD = 181.01	M = 259.07 SD = 199.59
	*t(*135) = 1.20, *p* = .94, *d* = .21		*t(*139) = .71, *p* = .79, *d* = .12	
Analytical Thinking	M = 22.06 SD = 12.74	M = 29.78 SD = 17.29	M = 27.31 SD = 17.70	M = 28.48 SD = 18.36
	*t(*135) = -2.98, *p* = .01*, *d* = -.51		*t(*139) = -.38, *p* = .95, *d* = -.07	
Authentic communication	M = 91.49 SD = 6.66	M = 89.37 SD = 13.79	M = 90.70 SD = 12.07	M = 88.19 SD = 15.53
	*t(*135) = 1.15, *p* = .02*, *d* = .20		*t(*139) = 1.08, *p* = .25, *d* = .18	
Tone of disclosure	M = 50.22 SD = 25.67	M = 52.32 SD = 27.02	M = 55.48 SD = 26.74	M = 58.44 SD = 27.72
	*t(*135) = -.47, *p* = .42, *d* = -.08		*t(*139) = -.65, *p* = .83, *d* = -.11	
Linguistic style	M = 77.23 SD = 3.30	M = 76.63 SD = 3.58	M = 76.83 SD = 2.87	M = 76.11 SD = 3.40
	*t(*135) = 1.02, *p* = .21, *d* = .18		*t(*139) = 1.38, *p* = .12, *d* = .23	
Affect communicated	M = 7.58 SD = 1.99	M = 7.43 SD = 2.01	M = 7.32 SD = 2.29	M = 7.78 SD = 2.66
	*t(*135) = .45, *p* = .81, *d* = .08		*t(*139) = -1.11, *p* = .84, *d* = -.19	
Function words used	M = 62.05 SD = 3.02	M = 61.24 SD = 3.64	M = 61.57 SD = 3.64	M = 61.00 SD = 3.39
	*t(*135) = 1.43, *p* = .22, *d* = .24		*t(*139) = .96, *p* = .93, *d* = .16	

Verbs used	M = 20.30 SD = 2.24	M = 19.76 SD = 2.58	M = 19.60 SD = 2.49	M = 19.91 SD = 3.00
	*t(*135) = 1.30, *p* = .08, *d* = .22		*t(*139) = -.66, *p* = .11, *d* = -.44	
Pronouns used	M = 18.19 SD = 2.73	M = 17.58 SD = 2.86	M = 18.81 SD = 2.76	M = 18.72 SD = 2.90
	*t(*135) = 1.28, *p* = .83, *d* = .22		*t(*139) = .20, *p* = .90, *d* = -.30	
Positive Tone	M = 4.69 SD = 1.82	M = 4.65 SD = 1.82	M = 4.68 SD = 1.77	M = 5.05 SD = 2.21
	*t(*135) = .14, *p* = .97, *d* = .02		*t(*139) = -1.10, *p* = .22, *d* = -.52	
Negative Tone	M = 2.66 SD = 1.04	M = 2.49 SD = 1.32	M = 2.31 SD = 1.21	M = 2.30 SD = 1.31
	*t(*135) = .85, *p* = .27, *d* = .15		*t(*139) = .01, *p* = .90, *d* = -.33	
Positive Emotion	M = 2.34 SD = 1.35	M = 2.45 SD = 1.40	M = 2.18 SD = 1.38	M = 2.40 SD = 1.36
	*t(*135) = -.43, *p* = .49, *d* = -.07		*t(*139) = -.93, *p* = .88, *d* = -.49	
Negative Emotion	M = 1.81 SD = .78	M = 1.68 SD = 1.08	M = 1.36 SD = .86	M = 1.52 SD = .94
	*t(*135) = .79, *p* = .04*, *d* = .13		*t(*139) = -1.21, *p* = .41, *d* = -.52	

Note. Asterisk is shown when there is a significant difference.

A supplementary MANOVA on the combined LIWC outcomes did not reveal a significant multivariate effect of voice condition ($F(13, 127) = .64$, $p = .82$, Wilks' $\Lambda = .94$, partial $\eta^2 = .06$). Given this null omnibus result, and because individual LIWC indices were

specified *a priori* as theoretically distinct dimensions of disclosure, these outcomes were analysed separately without applying correction for multiple testing.

Study 2 Discussion

Study 2 set out to replicate findings from Study 1 but extend them to a non-western, collectivistic culture sample. Results of Study 1 are largely confirmed in that interested sounding voices affect listeners' basic psychological need satisfaction (here autonomy and relatedness) positively. This time, findings also revealed that listeners were not only more willing to help the speakers when they asked them questions in interested-sounding voices, but also felt better with themselves after the conversation. Similar to Study 1, though, self-disclosure outcomes were not predicted by voice condition. Moreover, the analytical thinking effect reported in Study 1 was not replicated.

While complementary results were obtained from samples from two different cultural backgrounds, these findings do not allow to assess whether *cross-cultural* communication settings could affect the benefits of interested sounding voices, given that the speaker and listeners had the same cultural background. This is important to explore when considering research on cross-cultural vocal *emotion* recognition, which by and large revealed both universal and culture-specific principles (Laukka & Elfenbein, 2021; Sauter et al., 2010; Scherer et al., 2001). For example, Paulmann and Uskul (2014) revealed that emotional prosody recognition was better when materials were spoken by in-group members. This was true for both Chinese and British listeners. However, there was also an indication in the data that familiarity with the language (e.g., Chinese speakers living in Britain) helped to discern vocal cues. Examining responses across cultural groups, therefore, allows for a stronger test of whether the effects of vocal cues

on disclosure and psychological outcomes are generalisable or moderated by cultural expectations. This approach helps avoid over-generalising findings derived from a single cultural perspective.

Thus, Study 3 explored how speaker/listener group relationships (in vs. outgroup) can affect the effects of tone of voice. Building on the observation that familiarity with the speaker's culture enhances recognition, we hypothesise that wellbeing effects might be most beneficial when spoken to in an interested-sounding voice from an in-group member. However, if the effect of sounding interested in the other person is the most crucial component in social interactions, then we expect to find no differences in responses to different speaker groups.

Study 3

Methods

Participants. We excluded participants from the previous two studies and screened for participants that were either South Asian or Southeast Asian ethnicities to represent the Asian in-group sample. For the British sample, we filtered for native speakers of English, country of birth in the UK, nationality as British and places spent before turning 18 to be in the UK. Data were collected from 215 participants (British = 104 (47 men), Asian = 111 (48 men). Sensitivity power analysis using G*Power showed that the achieved sample size (N = 215) provided 80% power to detect effects of approximately f = .19**.** The ethnicities of the British participants were predominantly White (92.3%), while the Indian participants were reported as Asian (99.1%). Participant ages ranged from 19-80 years

with *M* = 38.63, *SD* = 14.17 for the British participants group while Indian participants' ages ranged from 19-64 years with *M* = 32.05, *SD* = 9.95.

Procedure. Study 3 aimed to replicate Studies 1 and 2 employing a within-subjects design; in addition, three new survey questions were added to assess *group belongingness* by asking whether 1) the participants feel similar to the speaker, 2) how much they feel they would have in common with the speaker and 3) to what extent the participants feel they belong to the same social group as the speaker from a scale of 1 (not at all) to 7 (a great deal). Questions asked by South Asian and British speakers in interested and uninterested voices were presented randomly to participants.

Experimental Voice Materials. Materials from four middle-aged speakers (2 Indian, 2 British) used in Studies 1 and 2 were selected. As before, eight questions were retained, resulting in speakers asking one question each in both of the voice conditions.

Results

Employing a mixed ANOVA, we analysed the effect of voice *condition* (interested and uninterested voices) and *speakers*' culture (native British and native Indian) on British and Indian *listeners*' perceived closeness and autonomy, intention to help and conversational satisfaction, group belonging, as well as self-disclosure.

Manipulation check. Ratings of how *interested* the speaker sounded (curious, engaged, friendly, warm) were averaged to form a composite score for the interested voice for each speaker (Indian, British). Similarly, ratings of how *uninterested* the speaker sounded

(bored, rushed, dismissive, tired) were averaged to form a composite score for the uninterested voice for each speaker. Descriptive statistics for the composite manipulation-check scores showed that, for the *Interested* condition, mean ratings were similar across speaker and listener groups: Indian listeners rated Indian speakers at M = 5.06 (SD = 1.05) and British speakers at M = 4.97 (SD = 1.22), while British listeners rated Indian speakers at M = 4.94 (SD = 1.06) and British speakers at M = 5.22 (SD = .95). For the *Uninterested* condition, composite ratings were lower for British speakers (Indian listeners: M = 3.59, SD = 1.34; British listeners: M = 3.64, SD = 1.48) compared with Indian speakers (Indian listeners: M = 5.06, SD = 1.18; British listeners: M = 4.55, SD = 1.14).

Perceived Closeness

A main effect of *Condition* (F(1, 213) = 338.48, p < .001, η^2_p = .61) revealed that interested-sounding voices led participants to feel closer to speakers compared to listening to uninterested voices. The main effect for *Speakers* (F(1,213) = 217.96, p < .001, η^2_p = .51) suggests that listeners felt closer to British speakers than to Indian speakers, irrespective of listener group. There was also a main effect on *Listeners* (F(1,213) = 10.48, p = .001, η^2_p = .05) suggesting that Indian listeners felt closer to both speaker backgrounds than British listeners.

Main effects were informed by a *Speakers* x *Condition* (F(1,213) = 73.04, p < .001, η^2_p = .25) interaction. Post-hoc pairwise comparisons by *Speakers* revealed that listeners rated feeling closer to speakers who used interested-sounding voices (Indian speakers: M =4.18, SE =.08; British speakers: M = 4.57, SE = .07) compared to the same speakers

using uninterested voices (Indian speakers: M = 2.79, SE = .07; British speakers: M = 3.91, SE = .08; all *p*s <.001). The interactions *Speakers* x *Listeners* and *Condition* x *Listeners* were not significant.

Finally, a significant three-way interaction *Condition* x *Speakers* x *Listeners* was observed ($F(1,213) = 15.38$, $p < .001$, $\eta^2_p = .07$), suggesting differences between conditions for speakers and listeners from different language backgrounds. This 3-way interaction was followed up with pairwise comparisons for each speaker and listener group, revealing that speakers who used interesting-sounding voices were generally perceived as more relatable than those with uninteresting-sounding voices (all *p*s <.001).

Perceived Autonomy

We observed a main effect of *Condition* ($F(1,213) = 360.67$, $p < .001$, $\eta^2_p = .63$) showing that interesting-sounding voices led participants to feel more autonomy when listening to interested voices compared to uninterested voices. There was also a main effect for *Speakers* ($F(1,213) = 183.74$, $p < .001$, $\eta^2_p = .46$) revealing that listeners felt more autonomy supported after listening to British compared to Indian speakers. In addition, the main effect of *Listeners* ($F(1,213) = 7.03$, $p = .009$) showed that Indian listeners perceived more autonomy after listening to materials compared to British listeners.

The two-way interaction *Speakers x Condition* ($F(1,213) = 66.41$, $p <.001$, $\eta^2_p = .24$) was significant. A step-down analysis by *Speakers* found that the *Condition* effect was significant for both speaker voices (*p*s <.001). Post-hoc comparisons revealed that listeners felt more autonomy supported after listening to speakers who used interested-sounding voices (Indian speakers: *M* = 4.44, *SE* =.08; British speakers: *M* = 4.79, *SE*

= .07) compared to the same speakers using uninterested voices (Indian speakers: *M* = 3.03, *SE* = .07; British speakers: *M* = 4.11, *SE* =.08). The interactions *Speakers x Listeners* and *Condition x Listeners* were not significant.

Finally, a significant three-way interaction *Condition x Speakers x Listeners* was observed ($F(1,213) = 16.03$, $p < .001$, $\eta^2_p = .07$), suggesting differences between conditions for speakers and listeners from different language backgrounds. This 3-way interaction was followed up with pairwise comparisons for each listener group and speaker, revealing that irrespective of speaker background, those speakers who used interesting-sounding voices led to higher feelings of perceived support than speakers who didn't show an interest in the listeners (all *p*s ≤.001).

Intention to Help and Perceived Conversation Satisfaction

A main effect of *Condition* ($F(1,213) = 230.40$, $p < .001$, $\eta^2_p = .52$) revealed that listening to interested-sounding voices led participants to feel an increased intention to help compared to listening to uninterested-sounding voices. The main *Speakers* effect ($F(1,213) = 128.28$, $p < .001$, $\eta^2_p = .38$) showed that listeners felt a higher intention of providing help to others after listening to British speakers compared to Indian speakers. No main effect of *Listeners* was found.

The significant two-way interaction *Speakers* x *Condition* ($F(1,213) = 29.13$, $p < .001$, $\eta^2_p = .12$) was informed by the three-way interaction *Speakers* x *Condition* x *Listeners* ($F(1,213) = 4.44$, $p < .05$, $\eta^2_p = .02$). Follow-up analyses revealed that both *Listener* groups reported an increased intention to help after listening to speakers who

used interested-sounding voices compared to uninterested-sounding voices (all *p*s ≤.001). No other interactions were significant.

Similar results were observed when looking at satisfaction with the conversation. Again, a main effect of *Condition* ($F(1,213) = 130.72$, $p < .001$, $\eta^2_p = .38$) showed that listeners were more satisfied with the conversation if the speaker asked questions in an interested-sounding way. The main effect of *Speakers* ($F(1,213) = 63.69$, $p < .001$, $\eta^2_p = .23$) showed that satisfaction was higher after being asked questions by British speakers. The two-way interaction *Speakers* x *Condition* ($F(1,213) = 10.59$, $p < .001$, $\eta^2_p < .05$) was significant. So was the three-way interaction *Speakers* x *Condition* x *Listeners* ($F(1,213) = 5.75$, $p < .05$, $\eta^2_p = .03$). Post-hoc comparisons revealed that both listener groups showed higher satisfaction when speakers used interested sounding voices compared to uninteresting sounding voices, irrespective of speaker background (all *p*s ≤.001).

Group Belonging

A main effect of *Condition* ($F(1,213) = 232.75$, $p < .001$, $\eta^2_p = .52$) revealed that participants felt more in common with the speakers using interesting-sounding voices compared to uninterested voices. There was also a main effect of *Speakers* ($F(1,213) = 136.46$, $p < .001$, $\eta^2_p = .39$) which showed that listeners felt more similar to the British speakers than the Indian speakers. The *Listeners* effect was not significant (*p*=.3).

The two-way interaction *Speakers x Condition* ($F(1,213) = 67.26$, $p < .001$, $\eta^2_p = .24$) was significant, as was the three-way interaction between *Condition x Speakers x*

Listeners ($F(1,213) = 13.42$, $p < .001$, $\eta^2_p = .06$). Follow-up analyses by *Speakers* and *Listener*s showed that listening to interesting-sounding voices generally led to stronger feelings of group belonging than uninteresting voices, irrespective of speaker or listener background (all *p*s <.001).

Tables 7 and 8 summarise the results for each dependent variable reported.

Table 7 Results for the Main Effects and the Interaction between Factors for each Dependent Variable except Self-Disclosure

DV	***Condition***		***Speakers***		***Listeners***		***Condition x Speakers x Listeners***	
	F(1,213)	***p***	***F(1,213)***	***p***	***F(1,213)***	***p***	***F(1,213)***	***p***
Perceived closeness	223.60	< .001	119.54	< .001	10.48	*p* = .001	15.38	< .001
Perceived autonomy	360.66	< .001	183.74	< .001	7.03	*p* = .009	16.03	< .001
Intention to help	230.40	< .001	128.28	< .001	1.30	*p* = .255	4.44	< .05
Satisfaction interaction	130.72	< .001	63.69	< .001	3.25	*p* = .073	5.75	< .05
Group belonging	232.75	< .001	136.46	< .001	1.10	*p* = .296	13.42	< .001

Table 8 Means, Standard Deviations (SD) and Post-hoc Comparisons for Each Dependent Variable

DV	***Speaker***	***Listener Group***	***Interested Voices***		***Uninterested Voices***		***Post-hoc comparison***	
			Mean	***SD***	***Mean***	***SD***	***Mean Difference***	***p***
Perceived closeness	British	British	4.45	1.02	3.59	1.11	0.85	<.001
		Asian	4.68	1.05	4.22	1.26	0.46	<.001
	Asian	British	3.94	1.12	2.69	0.84	1.25	<.001
		Asian	4.42	1.13	2.91	1.09	1.52	<.001
	British	British	4.71	.99	3.81	1.18	0.91	<.001

Perceived autonomy	Asian	Asian	4.85	1.03	4.40	1.25	0.45	<.001
		British	4.24	1.08	2.96	.89	1.29	<.001
		Asian	4.64	1.11	3.09	1.10	1.55	<.001
Intention to help	British	British	5.06	1.17	4.29	1.42	0.77	<.001
		Asian	5.14	1.09	4.70	1.27	0.44	<.001
	Asian	British	4.68	1.29	3.58	1.34	1.10	<.001
		Asian	4.81	1.19	3.62	1.31	1.20	<.001
Satisfaction interaction	British	British	4.91	1.28	4.31	1.41	.61	<.001
		Asian	5.15	1.09	4.80	1.26	.35	<.001
	Asian	British	4.64	1.30	3.95	1.44	.69	<.001
		Asian	4.93	1.09	4.01	1.39	.92	<.001
Group belonging	British	British	4.21	1.14	3.56	1.08	.65	<.001
		Asian	4.01	1.23	3.76	1.25	.25	=.006
	Asian	British	3.60	1.12	2.57	.98	1.04	<.001
		Asian	3.98	1.13	2.72	1.16	1.25	<.001

Self-disclosure

The main effects of *Condition* were significant across all LIWC variables of interest (all *F*s > 4.15 and all *p*s < .05) except for negative tone ($F(1,213) = .01$, $p = .91$, $\eta^2_p = .00$), positive emotion ($F(1,213) = .79$, $p = .38$, $\eta^2_p = .01$), and negative emotion ($F(1,213) = 3.02$, $p = .08$, $\eta^2_p = .01$), highlighting differences in the way listeners responded to interested and uninterested sounding voices. The main effects of *Speakers* showed different responses to British when compared to Asian speakers (all *F*s > 10.81 and all *p*s < .05) for all categories except for the categories Verb ($F(1,213) = 2.82$, $p = .10$, $\eta^2_p = .01$) and Affect ($F(1,213) = .01$, $p = .93$, $\eta^2_p = .00$). For the categories analytic, tone, linguistic, function, verb, positive tone, and negative tone, differences were observed for the two *Listener* groups (all *F*s > 4.24 and all *p*s ≤ .05) while no such differences were found between listeners from different backgrounds for all other categories tested. All main effects, additional 2- and 3-way interactions, including post-hoc comparisons were relevant are summarised in Tables 9 and 10.

Table 9 Results for the Main Effects and the Interaction between Factors for each Self-Disclosure Variable

DV		***Condition***		***Speakers***		***Listeners***		***Condition x Speakers x Listeners***	
	df	***F***	***p***	***F***	***p***	***F***	***p***	***F***	***p***
Word Count	1,213	26.88	<.001	10.82	.001	2.25	.135	2.96	.087
Analytic	1,213	15.91	<.001	24.41	<.001	4.44	.036	.176	.675
Authentic	1,213	30.54	<.001	49.33	<.001	2.42	.122	.011	.917
Tone	1,213	13.55	<.001	223.22	<.001	6.85	.009	3.08	.081
Linguistic	1,213	54.22	<.001	90.61	<.001	13.10	<.001	.368	.545
Function	1,213	25.69	<.001	55.21	<.001	9.46	.002	.002	.964
Verb	1,213	4.16	.043	2.82	.095	4.60	.033	.265	.607
Pronouns	1,213	44.23	<.001	40.55	<.001	.003	.956	.087	.768

Affect	1,213	12.54	.007	.009	.926	1.19	.276	.016	.899
Positive Tone	1,213	32.66	<.001	75.93	<.001	4.72	.031	.723	.396
Negative Tone	1,213	.01	.908	250.27	<.001	4.25	.041	1.95	.164
Positive Emotion	1,213	.79	.376	79.78	<.001	2.81	.095	.002	.967
Negative Emotion	1,213	3.02	.083	310.12	<.001	1.65	.200	.192	.662

Table 10 Means, Standard Deviations (SD) and Post-hoc Comparisons for Each Dependent Variable

DV	***Speaker***	***Listener Group***	***Interested Voices***		***Uninterested Voices***		***Post-hoc comparison***	
			Mean	***SD***	***Mean***	***SD***	***Mean Difference***	***p***
Word Count	British	British	88.48	44.73	79.69	39.97	8.79	.007
		Asian	78.49	47.86	73.28	58.82	5.21	.097
	Asian	British	80.08	39.01	76.89	37.21	3.18	.299
		Asian	75.91	48.47	64.62	38.61	11.30	<.001
Analytic	British	British	28.58	23.45	20.33	21.86	8.26	.005
		Asian	36.37	27.71	24.40	19.36	11.97	<.001

Authentic	Asian	British	22.42	19.45	44.46	26.97	22.04	<.001
		Asian	25.35	21.20	46.25	26.85	20.90	<.001
	British	British	96.19	8.86	81.79	23.40	14.41	<.001
		Asian	96.74	6.96	75.67	29.68	21.07	<.001
	Asian	British	76.08	27.36	80.22	22.90	4.14	.214
		Asian	76.98	26.52	73.85	27.67	3.13	.331
Tone	British	British	42.30	29.54	20.99	30.90	21.31	<.001
		Asian	43.83	31.82	34.09	33.44	9.74	<.001
	Asian	British	50.09	36.27	82.14	26.25	32.05	<.001
		Asian	55.64	32.50	84.02	26.06	28.38	.026
Linguistic	British	British	79.48	5.21	79.92	4.81	.44	.548
		Asian	78.39	5.20	77.61	6.98	.77	.275
	Asian	British	78.47	4.74	73.82	5.49	4.65	<.001
		Asian	77.03	5.75	72.09	6.54	4.95	<.001
Function	British	British	62.17	4.74	64.72	5.52	2.55	<.001
		Asian	62.06	5.02	63.76	6.20	1.70	.013
	Asian	British	64.25	4.91	58.95	5.59	5.31	<.001
		Asian	62.42	5.65	56.32	6.95	6.10	<.001
Verb	British	British	19.30	4.39	21.05	4.55	1.76	.003
		Asian	17.90	4.39	20.46	5.09	2.55	<.001
	Asian	British	21.35	4.87	19.63	4.64	1.72	.003

		Asian	20.04	4.04	19.71	4.70	.33	.547
Pronouns	British	British	17.60	3.54	19.51	4.85	1.91	.001
		Asian	17.81	5.03	19.39	5.09	1.58	.006
	Asian	British	19.52	4.31	14.22	3.76	5.30	<.001
		Asian	19.43	4.68	14.13	4.17	5.31	<.001
Affect	British	British	6.66	2.96	8.86	4.07	2.20	<.001
		Asian	6.47	3.10	8.81	4.66	2.34	<.001
	Asian	British	7.57	3.06	7.10	3.55	.47	.346
		Asian	8.34	4.27	7.88	4.89	.46	.337
Positive Tone	British	British	4.00	2.59	3.59	3.21	.41	.364
		Asian	3.93	2.53	4.47	3.87	.53	.226
	Asian	British	4.26	2.89	6.68	3.64	2.42	<.001
		Asian	4.90	3.02	7.55	4.68	2.65	<.001
Negative Tone	British	British	2.60	1.44	5.15	3.10	2.55	<.001
		Asian	2.48	1.76	4.17	2.83	1.70	<.001
	Asian	British	2.43	2.34	.35	.82	2.08	<.001
		Asian	2.40	2.42	.30	.89	2.10	<.001
Positive Emotion	British	British	1.48	1.34	1.68	2.37	.192	.519
		Asian	1.80	1.46	2.19	2.94	.387	.179
	Asian	British	3.10	2.52	2.97	2.15	.133	.675
		Asian	3.20	2.68	3.29	2.82	.088	.774

Negative Emotion	British	British	2.06	1.37	3.54	2.41	1.48	<.001
		Asian	1.89	1.46	3.02	2.25	1.13	<.001
	Asian	British	1.05	1.39	.17	.61	.88	<.001
		Asian	1.19	1.64	.16	.71	1.12	<.001

Outcomes were pre-specified (a priori) tests of separate predictions, not interchangeable indicators of a single construct. Therefore, each dependent variable was analysed on its own rather than combined into one omnibus test.

Study 3 Discussion

Study 3 sets out to investigate how cross-cultural communication settings between British and Indian speakers could further demonstrate the benefits of interested-sounding voices, ensuring that speakers and listeners have the same cultural background to test speaker-listener group relationships (in vs. outgroup) on listeners' behavioural outcomes. Study 3 replicated the robust benefits of interested-sounding voices observed in Studies 1 and 2, showing that listeners consistently reported higher levels of closeness, autonomy, conversational satisfaction, intention to help, and group belonging when spoken to in an interested tone compared to an uninterested one. These findings strengthen the evidence that vocal prosody is a powerful driver of social connection and wellbeing across different cultural groups (see Paulmann & Uskul, 2014). Furthermore, the manipulation checks of the voice materials confirmed that participants reliably distinguished interested from uninterested voices, reinforcing the validity of these effects.

Interestingly, the results also revealed meaningful asymmetries depending on speaker and listener background. Contrary to our hypothesis, both British and Indian listeners reported stronger perceptions of closeness, autonomy, satisfaction, and group belonging when addressed by British compared to Indian speakers, regardless of their own cultural group. This suggests that sociolinguistic familiarity with Western English prosody may play a role in shaping listener judgments, which could also be possibly explained by prior research that has consistently shown that nonnative-accented speech is more difficult to process than native speech, often eliciting greater listening effort and leading to more negative social judgments (Jiang et al., 2020; Lev-Ari & Keysar, 2010; Rovetti et al., 2023). Notably, Indian listeners consistently reported higher ratings across

measures than British listeners, suggesting they may be more receptive or adaptable to vocal prosodic cues across cultural boundaries.

Self-disclosure analyses further nuanced the cross-cultural effects. While interested voices encouraged greater word count, authenticity, and analytic thinking, differences in linguistic patterns emerged depending on both speaker and listener groups. For example, Indian listeners disclosed more when responding to interested voices from both Indian and British speakers, while British listeners demonstrated variation in their use of pronouns, tone, and affect depending on speaker background. These results suggest that while the motivational benefits of interest-sounding voices are universal, the form of listeners' responses, in other words, how they linguistically express themselves, may be modulated by cultural expectations or norms in conversational contexts. Such findings resonate with broader literature showing that emotional prosody recognition combines both universal and culture-specific principles (Laukka et al., 2016; Laukka & Elfenbein, 2021)

Collectively, Study 3 provides critical evidence that the beneficial effects of interested voices are substantial across both speaker-listener cross-cultural contexts. By showing that cultural identity and linguistic background modulate the benefits of vocal interest, this study advances our understanding of the interplay between universal prosodic functions and culture-specific biases.

Internal Meta-Analysis for Studies 1, 2, and 3

There were some variability and inconsistencies in the support for our hypotheses across the three studies. Some of this variability may have been a result of slightly different study paradigms (e.g., different ethnicities across speakers; within- vs. between-

subject designs). We therefore completed an internal meta-analysis following recommendations from Goh and colleagues (2016) in order to highlight internal consistency in differences between interested and disinterested voices across the three studies. Internal meta-analyses provide a balance between embracing inconsistencies across studies, while still highlighting reliability (Maner, 2014; Goh et al., 2016). Table 11 presents the meta-analytic effects across all of the items. The forest plots for each meta-analytic effect are included in the Supplementary Online Materials (SOM; Figures S1-S12).

Consistent with our hypotheses, interested and uninterested voices differed across most outcomes (Zs > 4.98, *rs* ≥ .29), with particularly large effects for autonomy, relatedness, help, and satisfaction (Zs > 9.37, *rs* ≥ .53). Thus, across the studies, participants who listened to the interested voices, compared to uninterested voices, felt greater autonomy and relatedness with the speakers, and were more inclined to want to offer them help and support, and reported higher satisfaction. Participants who listened to the interested relative to uninterested voices also disclosed more (*i.e.*, greater word counts) in their responses. However, there were also consistent, yet unexpected differences with regard to the ways in which participants disclosed. Participants responding to interested voices expressed less immersion and emotionality in their responses (*lower affect*), used more formal language (*greater function*), more self-monitoring and inhibition in their responses (*lower authentic* and used more hierarchical language through *greater pronouns*) compared to people responding to uninterested voices. Participants also used less logical reasoning and complexity in their responses (*less analytic*), but more evidence of language comprehension (*greater linguistic*).

This suggests that despite disclosing more, people may have been more guarded when responding to an interested rather than disinterested voice. This could represent the context in which they are being asked to self-disclose, and perhaps uncertainty about the motivations behind the asker's intentions (*e.g.*, "why is this stranger so interested in me?"). Implications for future directions are addressed in the General Discussion.

Table 11 Meta-analytic effects of the mean differences between interested and uninterested voices across studies

Dependent Variables	***Z***	***r***
Relatedness	14.89***	.80
Autonomy	15.07***	.80
Help	12.08***	.67
Satisfaction	9.37***	.53
Word Count	4.98***	.29
Analytic	-4.430***	-.13
Authentic	-4.51***	-.27
Affect	-3.25**	-.19
Tone	-3.55**	-.21
Function	5.10***	.30
Linguistic	6.79***	.40
Pronouns	5.97***	.35
Verbs	-1.58	-.09
Positive Affect	-1.29	-.08
Negative Affect	-1.59	-.10

Note. †p<.10 *p<.05 **p<.01 ***p<.001. z reflects Fisher's z and r reflects the Mean r (Goh et al., 2016).

The addition of the internal meta-analysis ensures a comprehensive synthesis that mitigates the risks associated with selective reporting bias. By pooling the *r* values across the series, the analysis enhances the precision of the estimated effect size and accounts for the varied paradigms of the individual studies. This provides a more robust and stable foundation for the theoretical conclusions than a series of standalone interpretations, ensuring the findings are representative of the entire body of data.

General Discussion

This investigation set out to explore how listening to someone who shows an interest (in relative to disinterest) through voice cues affects listeners' wellbeing and self-disclosure. We explored this across three different studies that focused on speakers from different cultural contexts, namely listeners based in western and non-western contexts. Results confirmed that listening to someone asking a question in a voice that signalled sincere interest in receiving an answer led to enhanced psychological need satisfaction across all three studies, suggesting that showing an interest in someone has beneficial effects for listeners irrespective of background. Contrary to hypotheses, results from Studies 2.1 and 2.2 revealed no significant differences in disclosure length or type of language and words used; however, results from an internal meta-analysis and Study 2.3 suggest that listeners' psychological disclosures were, in fact, as much impacted by speakers' interested-sounding voices as were their psychological needs. Acoustic analyses of speakers' voices provide insight into the characteristics of an interested-sounding tone of voice, which is primarily conveyed through a higher pitch, quicker speech rate, and greater spectral quality compared to an uninterested-sounding tone of voice.

Showing an interest through the voice impacts listeners' psychological needs and self-reported wellbeing

Replicating results from the motivational prosody literature (e.g., Weinstein et al., 2018) but extending to a new social prosody field, current findings revealed that participants reported feeling closer to speakers who showed an interest in receiving their replies (i.e., disclosure). Participants also reported enhanced autonomy-support and increased

intention to help after listening to speakers who showed interest through voice cues. The results align with emotional contagion (Hatfield et al., 1993; Neumann & Strack, 2000), where individuals tend to mirror and resonate with the emotional states expressed by others, even in a virtual setting (Isabella & Carvalho, 2016), as performed in the current studies. Curiosity, exploration, and knowledge inquiry are elements that contribute to showing an interest (Silvia, 2005, 2008), and in this study, speakers' interested-sounding voices that demonstrate curiosity, warmth and care (posed from the questions in the construct) about the other person seem to foster a stronger connection between speakers and listeners. Moreover, these interested-sounding voices might have triggered more written responses in the listeners, hence the increased disclosure based on the psychological meanings of the words used, which ultimately led to listeners feeling a heightened closeness, a sense of autonomy and a greater inclination to assist the speakers.

The findings of increased psychological needs satisfaction are also supported by Self-Determination Theory (SDT; Ryan & Deci, 2017) which posits that satisfying three basic psychological needs (autonomy, relatedness, competence) contributes to individuals' overall wellbeing. When individuals perceive genuine interest from others, it fulfils their need for relatedness, fostering a sense of connection and closeness and this expands across different cultures as evidenced in Study 2.3 and supported by other cross-cultural studies (Martela & Riekki, 2018). This fulfilment of the relatedness need, coupled with the expression of interest from the speaker can empower individuals to feel more autonomous, enhancing their sense of control and self-determination. In turn, this increased sense of autonomy can positively impact their willingness to help others as it

reinforces their intrinsic motivation, which has been linked to greater wellbeing. Research suggests that positive emotions, such as sounding interested are contagious (Barsade, 2002a; Bhullar, 2012) and can have a profound impact on individuals' mental and emotional wellbeing. Experiencing positive emotions can lead to an upward spiral effect, enhancing resilience, broadening cognitive abilities, and building social connections. Therefore, when individuals encounter genuinely interested voices, they might experience a positive emotional shift, contributing to their wellbeing and subsequently fostering a greater willingness to engage and help others.

Listeners' disclosures based on speakers' interest-sounding voices

The findings from the mini-meta analysis indicate a robust effect between tones of voice and disclosure, particularly concerning psychological dimensions in written disclosure, such as the use of pronouns, linguistic style, and function words. This provides compelling insights into the intricate relationship between vocal cues of interest and subsequent disclosure behaviours. The emphasis on disclosure by investigating the written psychological dimensions suggests that while there is not always a major difference in disclosure length, significant variations in the linguistic patterns emerge when individuals respond to interested versus uninterested voices. This demonstrates the subtlety and complexity of the impact of vocal cues on subsequent communication processes. Past studies have shown that in measuring disclosure, psychological meanings of the words used (Houghton & Joinson, 2012; Pennebaker & Graybeal, 2001; Tan et al., 2021; Tausczik & Pennebaker, 2009) in terms of authenticity, analytical thinking, affective words used, and pronouns signify the person disclosing their state of mind. The current study

adds a novel contribution in social prosody, demonstrating the direct implication of how speakers' showing an interest through their voice cues influences listeners' psychological state when disclosing information to both superficial (e.g., What are your hobbies?) and intimate (e.g., Describe the last time you felt lonely") questions.

Cross-cultural impact of showing an interest through vocal tones

Study 2.3 extended the investigation of interested and uninterested tones of voice to a cross-cultural context, using validated materials from Studies 2.1 and 2.2 and focusing specifically on British and Indian speakers. This focus on the British and Indian speaker–listener relationship represents a justified and strategic choice, grounded in the prototypical work of Goh and McCue (2021).

Previous studies have shown that the tone and rhythm of speech across different languages can help detect emotions like fear, sadness, and anger (Laukka et al., 2016; Laukka & Elfenbein, 2021). Key acoustic features, like the speaker's pitch or loudness, play a significant role in signalling different emotions (Paulmann & Uskul, 2014; Pell et al., 2009). Results in Study 2.3 investigating in-group effects and cross-cultural prosody recognition show significant differences between listeners of interested and uninterested-sounding voices, but did not support the in-group preferences, as demonstrated in other cross-cultural prosody research (Paulmann & Uskul, 2014), including a recent meta-analysis of 37 cultures and in-group advantages in vocal expression (Laukka & Elfenbein, 2021). Our studies, however, reveal a consistent preference for British speakers, as both British and Indian listeners reported stronger perceptions of closeness, autonomy, satisfaction, and group belonging when addressed by British compared to Indian

speakers. This bias may reflect the well-documented advantage of native speakers, who are often perceived as more credible and less negatively judged than non-native speakers (Lev-Ari & Keysar, 2010). The finding is particularly notable given prior research showing that social categorization strongly shapes evaluations of vocal confidence, especially in the case of Australian speakers (Jiang et al., 2024). In line with our results, listeners' preference for British voices mirrors patterns found in other studies, such as the greater solidarity attributed to standard American English compared to Punjabi English (Dragojevic & Giles, 2016).

The significant effect on listeners' written disclosure identified in the mini-meta analysis highlights the practical value of modulating tone of voice to encourage open and meaningful communication through self-disclosure. Speaking with an interested tone, characterised by higher pitch and faster speech rate compared to an uninterested tones shape subsequent language use and willingness to disclose, with clear applications in interpersonal domains such as counselling and negotiations. Furthermore, it is valuable to take into account voice pitch (a component of tone of voice) as a factor that can impact judgments in a legal decision-making social interaction (Jin & Park, 2023). More broadly, the present studies capture interpersonal warmth (measured through the construct of relatedness), aligning with prior work conceptualising warmth both as a social emotion (Andersen & Guerrero, 1996) and a thermometer of social relations (Ijzerman & Semin, 2009). Interpersonal warmth, in turn, fosters positive relationships and greater social proximity (Williams & Bargh, 2008). Taken together, these findings demonstrate the powerful yet often overlooked role of tone of voice in shaping not only disclosure but also the quality of human connection across diverse contexts.

Notably, utilising this knowledge to refine communication strategies or interventions that emphasise authentic interest through vocal tone may deepen the quality of disclosure and strengthen relational bonds. Future research should further examine cultural moderators such as communication norms, background, and context of disclosure to advance cross-cultural understanding. In conclusion, the present studies highlight tone of voice as a subtle but powerful driver of disclosure, bridging interpersonal divides and shaping the delicate interplay between acoustic cues, cultural factors, and the willingness to share; reminding us that *how* something is said can matter as much as what is said.

CHAPTER 3

THE CADENCES OF VOICE: HOW TONE SHAPES LISTENERS' WELLBEING

Background

The objective of this chapter is to move beyond "interest" and examine a broader range of tone of voice patterns that may influence listeners. Studying a diverse set of vocal patterns is important because how speakers sound shapes not only how messages are received and interpreted by also how people feel within everyday interactions. By affecting relationships, communication dynamics, and wellbeing, tone of voice deserves closer attention beyond attitudinal prosody studies so far. First, Study 3.1 investigates friendly and unfriendly tones of voice in six social contexts. Then, Study 3.2 investigates praising and condescending tones of voice in the workplace context. Finally, Study 3.3 investigates encouraging and critical tones of voice, also in a workplace context. Studies 3.2 and 3.3 will be submitted for publication as a series of studies investigating the effects of varying tones of voice in the workplace, including Study 4.1 that combines all four voice conditions (praising, condescending, encouraging, and critical tones).

Keywords: tone of voice, friendly, praising, encouraging, condescending, critical, wellbeing

3.1: Friendly Tones of Voice Enhance Listeners' Wellbeing

Introduction

While there has been some past interest in studying friendly tone of voice, including the acoustic parameters of friendly tones (Chen et al., 2004), few studies examine how a friendly tone of voice impact listeners' affective states. Much prior research treats friendliness through behavioural cues, facial expressions, and verbal content in multimodal settings (Argyle et al., 1971; Walther et al., 2005), which may not transfer to audio-only communication. This gap matters in contexts where voice is the primary or only channel, such as telecare, customer service, crisis helplines, and online audio calls, where limited bandwidth removes visual cues and tone of voice may carry disproportionate weight for emotional experience and relational judgments.

Prosody research shows that vocal cues convey basic emotions and motivational states (Banse & Scherer, 1996; Scherer, 2003; Weinstein et al., 2018), yet the communicative function of attitudinal tones such as friendliness remains underexplored. Listeners can detect friendliness in speech (Nault et al., 2024; Ryzhkova, 2018; Walther et al., 2005), but its psychological impact on the listeners is rarely tested. It is still unclear whether sounding friendly enhances listeners' emotional wellbeing or fosters interpersonal closeness, particularly in different social contexts. Within this broader framework, friendliness can be expressed vocally through a communication style that is positive and well-intentioned (Ryzhkova, 2018). Although past research has explored vocal patterns associated with happiness, attractiveness, and trustworthiness (Ferdenzi et al., 2013; Jiang et al., 2020; Scherer et al., 2001; Wells et al., 2013), the vocal profile

of a friendly tone of voice and its impact on listeners' wellbeing, particularly their positive and negative affective states, remains underexplored.

Friendliness in different contexts

Friendliness is a foundational attribute in human interaction that signals warmth, openness, and positive intent (Ryzhkova, 2018). Across settings, it facilitates trust, mutual respect, and cooperation. For instance, in professional environments, friendliness is linked to accessibility, cheerfulness, and rapport-building (Liu et al., 2016). Organisational research finds that friendliness predicts commitment and cohesion in workgroups (Anderson et al., 2001) and that friendly recruiters shape favourable impressions of the organisation (Goltz & Giannantonio, 1995). Service contexts further highlight that tone of voice can be a primary relational cue, even if tone was not acoustically examined. For instance, visually impaired students reported that librarians' friendliness conveyed acceptance, value, care, and welcome, fostering a sense of belonging (Bodaghi et al., 2017). Related work with the same population noted that greetings and friendly conversations, particularly via tone of voice, signalled empathy (Bodaghi et al., 2016). These studies underscore the influence of a friendly vocal tone on listeners, and in these cases, those who cannot rely on visual cues.

Research on friendliness emphasises the importance of understanding how it shapes social experiences and impacts psychological health. For example, several research revealed how nurses' relationships with patients greatly impact patients' recovery; being friendly played a key role in the professional relationship and resulted in promoting wellness among troubled young adults (McCann & Baker, 2001). Similarly, another nurse-patient study indicates that mutuality, humour, fondness, and reciprocity,

as well as considerate nursing action and a light-hearted atmosphere, contributed to sustained patients' wellbeing and recovery because of the nurse's friendliness that made them feel validated, inclusive and encouraged (Geanellos, 2005). Beyond the health care sector, similar results have been reported, for example, commitment and satisfaction in workgroups are best predicted by others' being attentive, relaxed, and friendly, with friendly being referred to as not being hostile toward the other person (Anderson et al., 2001).

In addition, in an adolescent peer-rating study, voices were perceived as friendlier when speakers used faster speech rates and more assertive response strategies in hypothetical social interactions involving a peer being mean (Nault et al., 2024), however, the study did not investigate the impact of friendly attitudinal prosody on listeners themselves. Being friendly in communication is not only socially desirable but psychologically impactful because it helps build trust, strengthens interpersonal bonds, and encourages open dialogue, making it easier for individuals to connect and collaborate (Lincoln, 2000). In contrast, unfriendly communication (whether intentional or perceived) can push people away, create tension, and lead to misinterpretations or relational strain. These effects are particularly salient in contexts where tone of voice serves as a primary cue for emotional and relational intent, such as brief encounters or service interactions. Taken together, the literature highlights that friendliness supports interpersonal closeness and wellbeing across diverse contexts, yet the specific role of a *friendly tone of voice* (in comparison to an *unfriendly tone of voice*) in shaping listeners' affective states remains largely unexplored.

Present research

Building on the importance of friendliness in social interactions and the communicative power of tone, the present study examines how vocal friendliness shapes listeners' affective responses, with a focus on wellbeing and relatedness (perceived closeness to the speaker). Relatedness reflects feelings of care and social connection (Ryan & Deci, 2017), and prior work shows that voices conveying autonomy support can enhance these perceptions (Weinstein et al., 2020). Extending this evidence, the current study investigates whether friendly versus unfriendly tones of voice produce similar relational and affective outcomes.

Research further indicates that the impact of communication is shaped by relationship proximity. For instance, persuasive strategies are perceived as more effective and less relationally risky when directed at close partners, such as spouses, than at more distant figures like strangers (Sillars, 1980). Similarly, Flitzpatrick and Dindia (1986) found that relationship qualities such as satisfaction predict communicative behaviour differently depending on whether the partner is a spouse or a stranger. Together, these findings suggest that relationship closeness amplifies the emotional and behavioural consequences of communication, implying that vocal cues such as friendliness may carry greater affective weight in close relationships than in more distant or transactional ones.

To test these possibilities across a spectrum of everyday social interactions, the present study included six social contexts that vary in relational intimacy: friends, strangers, cashiers, librarians, neighbours, and spouses. This range enables comparisons between personal (spouses, friends, neighbours) and casual encounters (cashiers, librarians, strangers), capturing how subtle shifts in vocal expression could

influence listeners' sense of relatedness and wellbeing across close and distant relationships. By comparing friendly with unfriendly tones in these contexts, the study aims to investigate how prosody, relational proximity, and affective states interact in shaping everyday social interactions.

Hypothesis

There are three hypotheses that are predicted in this study:

H1: Participants will report higher feelings of relatedness (i.e., closeness) to speakers using friendly voices compared with unfriendly voices across all six social situations.

H2: Participants will experience higher positive affect and lower negative affect after listening to speakers using friendly voices compared with unfriendly voices.

H3: Relationship proximity will influence outcomes, such that relatedness, positive affect, and negative affect will be most pronounced in closer social relationships (spouse, neighbour, and friend) compared with more distant or casual interactions (cashier, librarian, and stranger).

Methods

The study has received ethical approval through the Ethics Subcommittee 1 of the University of Essex (ETH2223-1525).

Stimuli development

Initially, five speakers (3 females, 2 males, ages: 22-47) were recruited from a volunteer link managed by the Department of Psychology to speak materials for this study. After the recordings, materials from two speakers (2 females) were selected for the current

study. The selection was based on subjective judgments assessing who spoke most clearly in friendly and unfriendly sounding voices. Speakers were asked to record a set of questions in both friendly and unfriendly tones of voice for in six different contexts: speaking with a friend, a cashier, a stranger, a librarian, a neighbour, and spouse (e.g., "Hi, what can I do for you?; What are you doing this weekend? Do you have the full title of the book?). A full list of questions in all six situations is included in the Appendix B.

Table 12 Acoustic Analysis for the Friendly and Unfriendly Voice

Voice condition	***Acoustic parameters***			
	Fundamental frequency, F0 (Hz)	Speech rate (seconds)	LTAS (dB)	CPP (dB)
Friendly	233.84	4.60	9.78	30.55
Unfriendly	196.12	4.33	8.64	31.12

The acoustic analysis shows that friendly tones of voice are spoken with a higher pitch, slightly faster pace, and richer spectral energy, although not greater vocal quality than unfriendly tones of voice.

Design

Employing a within-subjects design, all participants listened to materials from both conditions. First, participants listened to the voice recordings of the speakers spoken in one of the conditions for one of the situations. Each situation had three short questions or expressions. Subsequently, participants filled out survey questions assessing one sub-scale from the basic psychological need satisfaction scale (Ryan & La Guardia, 2000; relatedness) as well as positive and negative affect. This process was repeated for all six

social situations and both voice conditions (resulting in a total of 12 voice recordings that participants listened to).

To assess relatedness (i.e. how much the speaker cared, understood and valued the listener's opinions and abilities), participants were asked the following questions: "How much do you feel like you could trust the speaker?", "How close did you feel to the speaker?", and "How much did you feel like the speaker really cared for you?". Participants responded on a scale from 1 (none at all) to 7 (a great deal). The Positive and Negative Affect scale (PANAS) was adapted from Watson et al. (1988). Participants rated 4 items for positive affect (how happy, energetic, interested, and pleased they felt after listening to the speaker) and 4 items for negative affect (angry, distressed, irritable, and disinterested) on a scale from 1 (none at all) to 7 (a great deal). The reliability scores for relatedness were $\alpha = .84$, for positive affect $\alpha = .86$ and for negative affect $\alpha = .87$.

Participants

150 (74 males, 74 females, 1 non-binary, 1 prefer not to say) participants residing in the UK aged 26-76 years (mean age: 46.86) participated in the online study and were recruited through Prolific. The majority of the participants were whites 113 (75.3%), followed by blacks 17 (11.3%) and Asians 13 (8.7%). A sensitivity power analysis conducted in G*Power ($\alpha = .05$) indicated that, with the achieved sample size, the study had 80% power to detect within-subject effects as small as $f = .07$.

Results

A repeated measures ANOVA for a 2 (*Conditions*) x 6 (*Situation*s) design was conducted to evaluate the effect of *Conditions* (friendly vs unfriendly) on participants' reported

relatedness to the speakers across six *Situations* (friend, stranger, cashier, librarian, neighbour, and spouse).

Relatedness

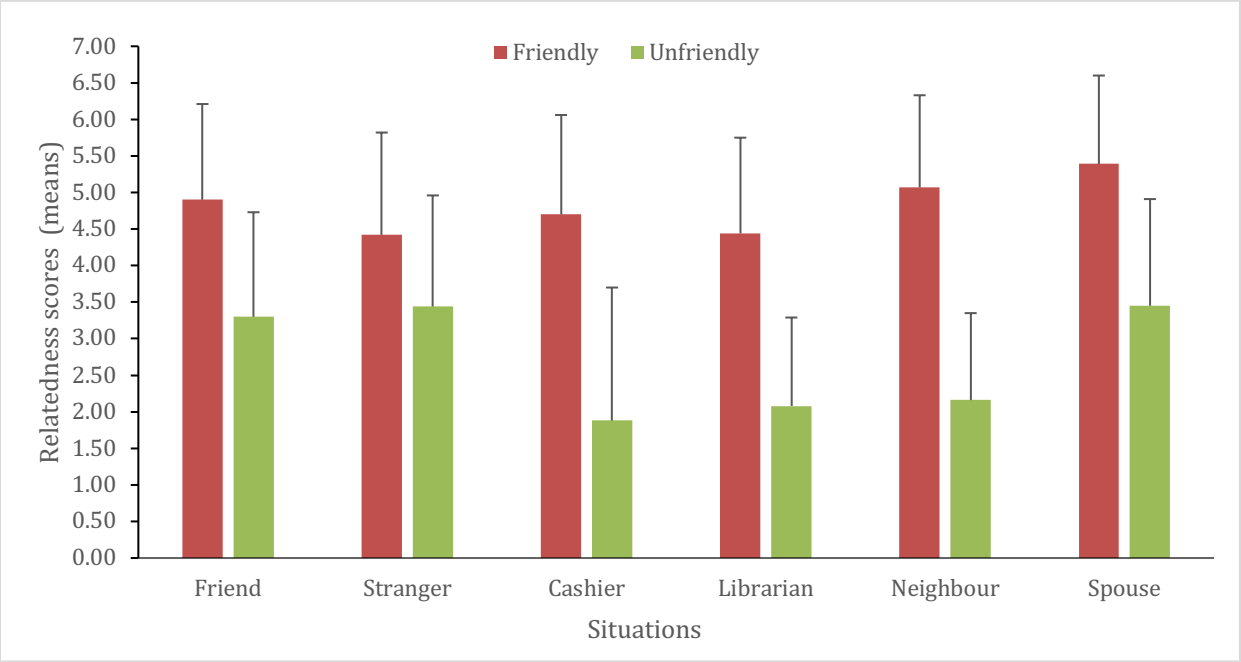
Results showed a significant main effect of *Condition*, $F(1, 149) = 593.23$, $p < .001$, $\eta^2_p = .80$), indicating that participants felt closer to speakers who spoke with friendly voices than to speakers who spoke with unfriendly tones of voice. Significant differences between the friendly and unfriendly conditions (friendly: $M = 4.82$, $SE = .08$; unfriendly: $M = 2.72$, $SE = .08$; $p < .001$) indicate that participants felt more connected to speakers who used a friendly tone when addressing them.

There was also a significant main effect of *Situation*s, $F(5, 745) = 54.64$, $p < .001$, $\eta^2_p = .27$ suggesting that feelings of relatedness varied across different situations. Pairwise comparisons revealed that participants felt the closest to speakers when imagining that they were addressed by their spouse ($M = 4.42$, $SE = .09$), followed by friend ($M = 4.10$, $SE = .09$), and stranger ($M = 3.93$, $SE = .10$). They felt less close when they thought they were addressed by a cashier ($M = 3.29$, $SE = .08$) or a librarian ($M = 3.26$, $SE = .08$), suggesting that the proximity of the relationship with the speaker influences feelings of relatedness.

There was also a significant *Conditions* x *Situations* interaction, $F(5, 745) = 47.53$, $p < .001$, $\eta^2_p = .24$. Looking at each situation separately, post-hoc pairwise comparisons revealed that participants reported feeling more related to speakers who used friendly voices than those who used unfriendly voices across all six situations (all $F > 47$; all $ps < .001$). Particularly, participants felt the closest to speakers in the spouse situation ($M = 5.39$, $SE = .10$) and the least related to speakers in the stranger situation ($M = 4.42$, SE

= .12) when spoken to with a friendly tone of voice. In contrast, participants felt closest to speakers in the spouse situation (*M* = 3.45, *SE* =.12) and the least related to speakers in the cashier situation (*M* = 1.88, *SE* = .10) when spoken to with an unfriendly tone of voice. Figure 4 displays the mean relatedness ratings for each situation and both voice types.

Figure 4 Mean Relatedness Scores for Friendly and Unfriendly Voices across Situations



Note. Responses were measured on a 1–7 scale; y-axis anchored at 0 for visual clarity.

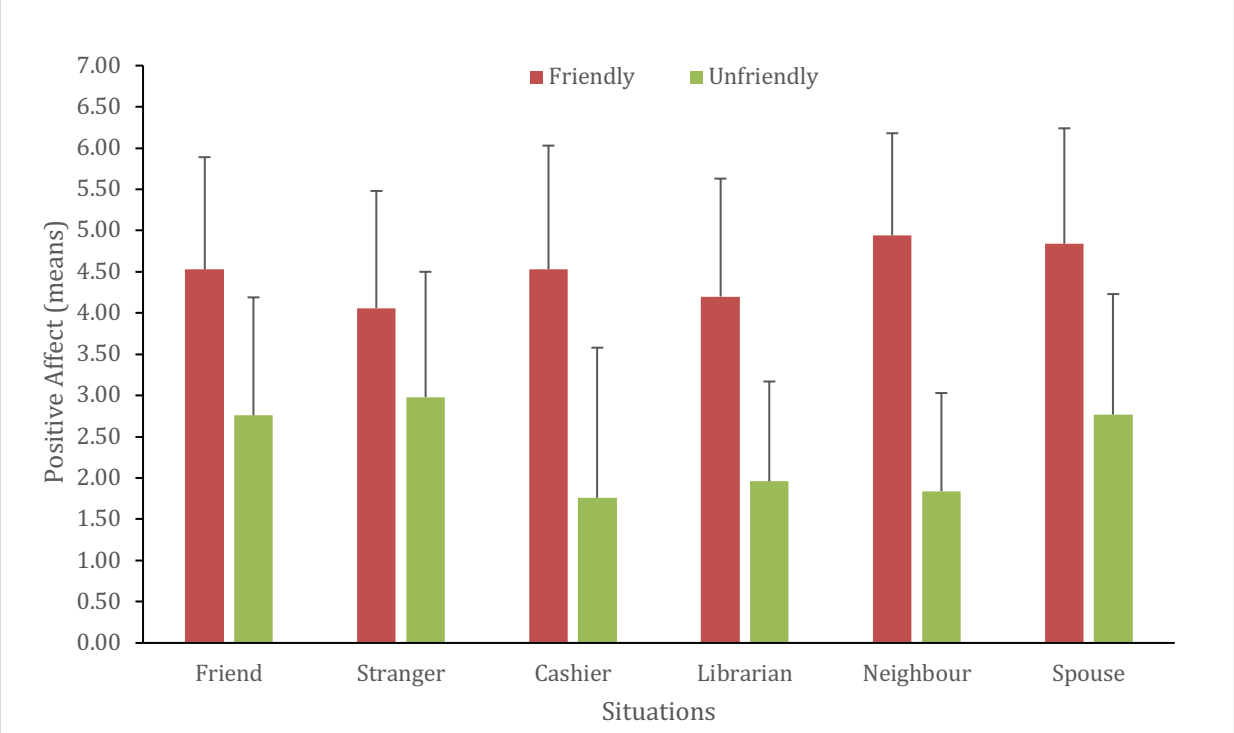
Positive Affect

Another 2 (*Conditions*) x 6 (*Situations*) repeated measures ANOVA was conducted. Results showed a significant main effect of *Conditions* $F(1, 149) = 554.99$, $p < .001$, $\eta^2_p = .79$, indicating that participants felt higher positive affect when speakers spoke with friendly voices compared to unfriendly voices (*M* = 4.52, *SE* = .08; unfriendly: *M* = 2.35, *SE* = .08; $p < .001$).

There was also a significant main effect of *Situations*, $F(5, 745) = 23.02$, $p < .001$, $\eta^2_p = .13$, suggesting that experienced positive affect varied across different situations. Post-hoc pairwise comparisons revealed significant differences between most situations (all *p*s < .001), except for the friend vs. stranger ($p = .11$), stranger and neighbour ($p = .15$) and cashier vs. librarian ($p = .37$) comparisons. Participants felt increased positive affect after listening to speakers in the spouse situation ($M = 3.81$, $SE = .09$), followed by friend ($M = 3.64$, $SE = .09$). Participants felt the least positive affect after listening to the cashier ($M = 3.15$, $SE = .08$) and librarian ($M = 3.08$, $SE = .09$), respectively.

The *Conditions* x *Situations* interaction was significant, $F(5, 745) = 44.45$, $p < .001$, $\eta^2_p = .23$. Follow-up comparisons within each situation confirmed that participants reported significantly higher positive affect after friendly (vs. unfriendly) voices across all six situations ($p < .001$). Particularly, participants felt the highest positive affect to speakers in the neighbour situation ($M = 4.94$, $SE = .12$) and the least positive affect related to speakers in the stranger situation ($M = 4.06$, $SE = .17$) when spoken to with a friendly tone of voice. In contrast, participants felt the highest positive affect to speakers in the stranger situation ($M = 2.98$, $SE = .12$) and the least positive affect to speakers in the cashier situation ($M = 1.76$, $SE = .08$) when spoken to with an unfriendly tone of voice. Figure 5 below summarises the mean positive affect across different situations for friendly and unfriendly voices.

Figure 5 Means Positive Affect Scores for Friendly and Unfriendly Voices across Situations



Note. Responses were measured on a 1–7 scale; y-axis anchored at 0 for visual clarity.

Negative Affect

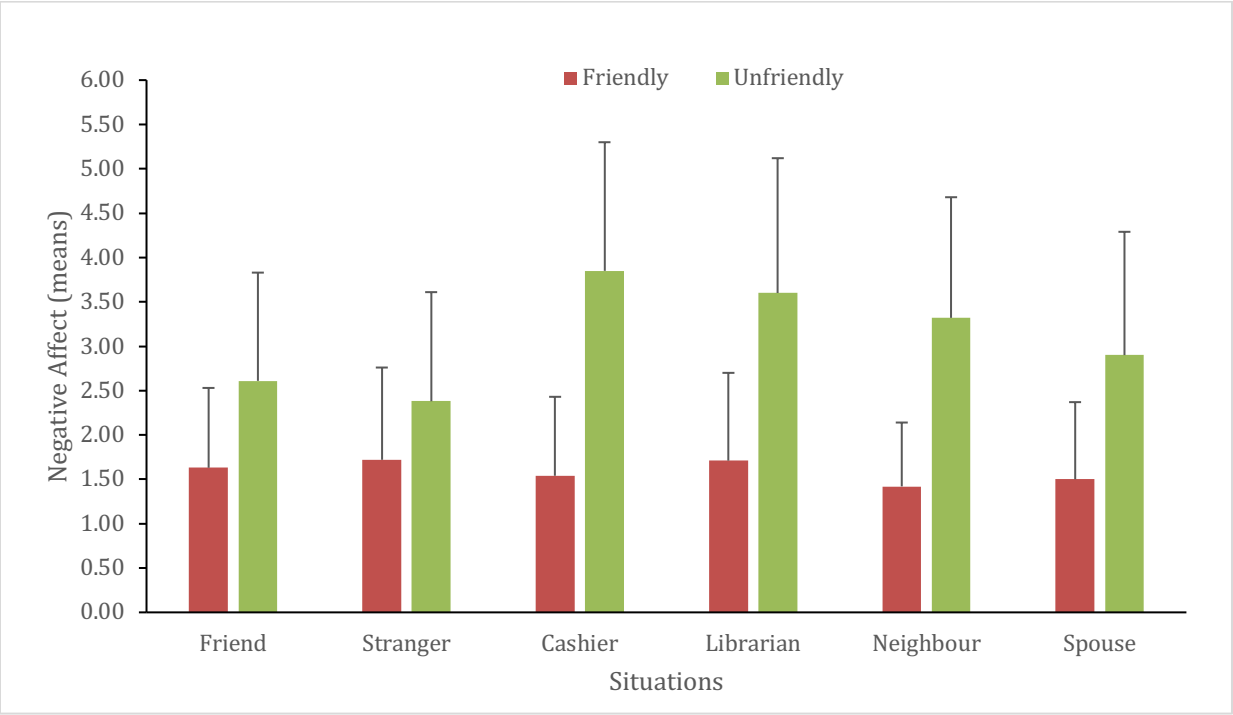
The main effect of *Condition* was significant, $F(1, 149) = 373.49$, $p < .001$, $\eta^2_p = .72$, showing that listeners experienced more negative affect after listening to unfriendly voices ($M = 3.11$, $SE = .09$) compared to friendly voices ($M = 1.59$, $SE = .05$).

The main effect of *Situation*s was also significant, $F(5, 745) = 32.33$, $p < .001$, $\eta^2_p = .18$, suggesting that negative affect was experienced differently across situations. Pairwise comparisons showed significant differences between all relevant comparisons ($p < .001$) except for the difference between friend and stranger ($p = .24$), friend and spouse ($p = .22$) and cashier and librarian ($p = .51$). Pairwise comparisons revealed that

participants felt the highest negative affect to speakers when imagining that they were addressed by their cashier (*M* = 2.70, *SE* = .07), followed by librarian (*M* = 2.66, *SE* = .08), and neighbour (*M* = 2.37, *SE* = .07). They felt less negative affect when they thought they were addressed by a friend (*M* = 2.12, *SE* = .07) or a stranger (*M* = 2.05, *SE* = .08), suggesting that the proximity of the relationship with the speaker influences feelings of relatedness.

Finally, the interaction between *Condition x Situation*s was significant, $F(5, 745) = 46.99$, $p < .001$, $\eta^2_p = .24$. Post-hoc pairwise comparisons demonstrated that participants felt increased negative affect in all six situations when speakers spoke with unfriendly voices compared to friendly voices. Particularly, participants felt the highest negative affect to speakers in the stranger situation (*M* = 1.72, *SE* = .09) and the lowest negative affect to speakers in the neighbour situation (*M* = 1.42, *SE* = .06) when spoken to with a friendly tone of voice. In contrast, participants felt the highest negative affect to speakers in the cashier situation (*M* =3.86, *SE* =.12) but the lowest negative affect to speakers in the stranger situation (*M* = 2.38, *SE* =.10) when spoken to with an unfriendly tone of voice. Figure 6 below summarises the mean relatedness ratings across different situations for friendly and unfriendly voices.

Figure 6 Means Negative Affect Scores for Friendly and Unfriendly Voices across Situations



Note. Responses were measured on a 1–7 scale; y-axis anchored at 0 for visual clarity.

Table 13 below summarises the main effect and interactions for all three dependent variables.

Table 13 Summary of Main Effects and Interactions for Relatedness, Positive Affect and Negative Affect

DV	Conditions		Situations		Condition x Situations	
	F(1, 149)	*p*	*F(1, 149)*	*p*	*F(1, 149)*	*p*
Relatedness	593.23	< .001	54.64	< .001	47.53	< .001
Positive Affect	554.99	< .001	23.02	< .001	44.45	< .001
Negative Affect	373.49	< .001	32.33	< .001	46.99	< .001

In summary, the findings show that tone of voice strongly shaped listeners' affective experiences across all social contexts. Participants consistently reported feeling more related and more positive affect when addressed with a friendly tone, and more negative affect when addressed with an unfriendly tone. However, the degree to which friendliness (or unfriendliness) influences the listeners depends on the social situation (who was speaking to them). Results demonstrate that relatedness was the highest when the speaker was a spouse, neighbour, or friend, whereas negative affect was most heightened in service-based interactions such as with cashiers or librarians.

Discussion

The current study examined how friendly and unfriendly tones of voice influence listeners' relatedness, positive affect, and negative affect across six everyday social contexts. Consistent with our hypotheses, listeners reported higher relatedness (feeling cared for, understood, and that their opinions were valued) and greater positive affect (feeling happy, energetic, interested, and pleased) when speakers used a friendly tone. In contrast, unfriendly voices produced the opposite pattern, decreasing relatedness and positive affect while increasing negative affect. Across the six social contexts, relationship proximity plays a role in shaping listeners' feeling of relatedness and positive affect. Results show that speakers in the spouse and neighbour situations elicited these outcomes more prominently than speakers in the other social contexts. In contrast, negative affect was more impacted by speakers in the stranger and cashier situations when spoken with a friendly tone and an unfriendly tone of voice, respectively. Collectively, these results demonstrate that a friendly tone of voice enhanced listeners'

wellbeing than an unfriendly tone of voice, and the affective and relational consequences are amplified or dampened depending on the closeness and nature of the social relationship.

Relatedness, one of the basic psychological needs from the Self-Determination Theory (Ryan & Deci, 2000), is fulfilled when listeners listen to friendly tones of voice rather than unfriendly tones of voice. This evidence suggests that vocal prosody could independently modulate this need, even within brief, hypothetical interactions, thus highlighting the importance of tone of voice as a key source of social connection, not just an addition to what is said. Past studies also support this when Weinstein et al. (2020) found that the autonomy-supportive tone of voice enhanced listeners' perceived closeness to the speakers. Moreover, moving beyond the basic emotions in prosody (Banse & Scherer, 1996), our results demonstrate that showing an intention to be friendly through the tone of voice contribute to listeners' affective and relational outcomes, extending on other research suggesting that listeners can detect friendliness in speech (Nault et al., 2024; Ryzhkova, 2018; Walther et al., 2005). Here, our study provides the empirical evidence how not only a friendly tone of voice (i.e.: sounding friendly, approachable, ready to help) is detected through the speech, but it also increases listeners' positive affect and feeling closeness to the speaker while reduces negative affect on the listeners, as opposed to when listening an unfriendly tone of voice (i.e.: unfriendly, not helpful, unapproachable).

Furthermore, our study identifies the acoustic features of a friendly tone of voice: spoken with a higher pitch in a slightly faster pace with higher spectral energy than an unfriendly tone of voice, consistent with previous findings that friendly speech is marked

by elevated pitch and energy (Chen et al., 2004). Prior work has linked higher pitch with perceptions of warmth (Wu et al., 2023) and with characterisations of friendliness as signalling openness and positive intent (Ryzhkova, 2018). This analysis resonates with applied research showing that visually impaired students perceive librarians' friendly tone as conveying acceptance, care, and belonging (Bodaghi et al., 2017) and empathy (Bodaghi et al., 2016), from the tone itself. Thus, these studies situate the acoustic analysis within broader understandings of how friendliness is expressed and perceived through the tone of voice.

Friendly tones in various social contexts

Relationship proximity is one of the factors influencing listeners' affective states. In our study, the speakers in the spouse and friend social situations yielded the highest relatedness and positive affect on the listeners. This pattern is consistent with prior work showing that relational closeness enhances social regulation (Giesen et al., 2018), such that language from a romantic partner strongly shapes interaction quality (Lau et al., 2018) and partners' speaking with kind words contributes to more positive feelings of their relationships (Marigold et al., 2007). These findings suggest that closer relationships exert a stronger influence on interactions, and our study extends this by showing that even when relationships are imagined, relational closeness amplifies feelings of relatedness and positive affect in response to a friendly tone of voice. In addition, the underlying effects of the increase in positive affect when participants heard friendly tones aligns with the principles of emotional contagion theory (Hatfield et al., 1993), which suggests that observing (or in our case listening to) someone else's affective state will lead to the same emotional state in the other person. This highlights that subtle vocal cues can have

meaningful psychological effects, particularly in perceived close relationships like those with a spouse or friend.

Interestingly, listeners' negative affect was amplified in a speaker in the cashier situation, followed by a librarian situation, when the speaker used an unfriendly tone, and lowest in the neighbour situation. This was the case even though listeners did not actually know the speakers, suggesting that voice effects are moderated by perceived speaker-listener relationships, but also that even strangers' tone of voice can impact listeners. Indeed, negative affect was particularly pronounced when listeners imagined someone unfamiliar speaking in an unfriendly manner. The more transactional nature of roles such as cashiers and librarians likely increases listeners' expectations that these speakers should be helpful and pleasant. When these expectations are violated by an unfriendly tone, negative affect is amplified. Past research using measures like the "Friendliness Factor" (Jordan, 2005; Saunders, 2013), similarly indicates that customers expect service personnel to appear welcoming and approachable, supporting the interpretation of our findings. This suggests that even brief, friendly vocal interactions can influence customer experience and satisfaction. This has practical implications, as it suggests that customer-facing services such as interactions with a cashier or librarian can induce negative feelings if the tone of voice is unfriendly, highlighting the importance of friendly vocal communication in transactional contexts. In comparison, a friendly tone spoken by a stranger elicited the highest negative affect, including feelings of distress across the social situations, suggesting that the absence of relational closeness and the potentially more transactional nature of the interaction with a stranger may also intensify this negative affective state.

Collectively, these findings revealed that the magnitude of the relational (relatedness) and affective (positive and negative affect) outcomes is influenced by the proximity of the relationship between the speaker to the listeners. Friendly tones of voice increased listeners' feeling closer to the speaker, positive affect, and decreased negative affect, and this is influenced by relationship proximity. The current study, thus, provide evidence that being friendly through the tone of voice is impactful in shaping listeners' wellbeing, and this applies to various everyday social contexts.

Conclusion

This study shows that a friendly tone of voice can meaningfully enhance listeners' sense of relatedness and positive affect, particularly in socially close contexts. In contrast, unfriendly tones increase negative affect, especially in transactional interactions. These findings highlight that subtle vocal cues alone can shape emotional and relational experiences, highlighting the importance of tone of voice in everyday communication.

3.2: Praising and Condescending Tones of Voice Predict Wellbeing and Work Commitment

Introduction

In recent years, the role of tone of voice in motivating interactions has gained considerable attention (Weinstein et al, 2019; Paulmann & Weinstein, 2023). These studies have predominantly focused on well-explored voice patterns such as autonomy-supportive and controlling tones of voice, whereby the speaker has the intention to get the other person to do something. This shift marks an important expansion in prosody research, which has historically concentrated on emotional prosody such as happiness, sadness, anger, and fear (Banse & Scherer, 1996; Kotz & Paulmann, 2007). Despite this shift and advancement, more subtle voice patterns within the motivational prosody (or attitudinal), such as praising, have not been systematically explored, as virtually nothing is known about the praising tone of voice in social interactions.

Imagine being told you have done a good job at work, but in a flat, distant, condescending tone of voice, rather than genuine praise. At that point, you would probably question whether you were being mocked or misunderstood. It was not the message; it was how it was delivered, in other words, the tone of voice. To understand why the tone matters, it is helpful to frame it in terms of motivational theory. The Self-Determination Theory (SDT; Ryan & Deci, 2017) posits that environments supporting basic psychological needs, such as relatedness, foster engagement, wellbeing, and intrinsic motivation. Supporting this, Weinstein et al. (2019) showed that mothers' speaking in an autonomy-supportive tone of voice, derived from SDT, elicited more

positive emotions, increased closeness, and intentional behavioural engagement among adolescents. Guided by these findings, a “good job” delivered in a praising tone of voice may foster positive affective states, while the very same words spoken condescendingly may erode them, leading to disengagement and negative affect. This contrast is the focus of the present study: examining praising versus condescending tones of voice in professional settings, where evaluations are frequent and their delivery could have lasting consequences.

Praise motivates, condescension devalues

Delin and Baumeister (1994) argued that praise, often equated with reinforcement to strengthen behaviour through positive feedback, should be understood as serving broader interpersonal functions, such as encouragement, socialisation, and influence. Supporting this, research has shown that praise *undid* the unfavourable effects of previous failure, increasing recipients’ affect and self-perceived intelligence even after repeated setbacks (Bąk & Leśniak, 2020), and in educational settings, behaviour-specific praise from teachers has been found to reduce disruptive behaviours (Myers et al., 2011; Reinke et al., 2007). However, not all praise is equally effective. Praise framed as controlling can dampen intrinsic motivation, while praise associated with enjoyment and effort can enhance it (Delin & Baumeister, 1994; Reavis et al., 2018). Collectively, these findings suggest that praise is not a uniformly positive act; its effects depend on how it is communicated and interpreted. Yet, while research has dissected the *types* and *framing* of praise, far less is known about the role of vocal tone in shaping how praise is received. This gap also points to a deeper issue in how communication is understood: the tendency

to focus on semantics while overlooking paralinguistic features, such as tone of voice, that critically shape behavioural outcomes.

On the other hand, a condescending environment may undermine the positive impact of otherwise constructive feedback, triggering feelings of inadequacy or resentment (Harnish & Bridges, 2011). Research on condescending language suggests that such communication often reflects power imbalances or perceived superiority (Perez Almendros & Schockaert, 2022) and, within workplace settings, it has been linked to lower job satisfaction, increased turnover intentions, and broader patterns of incivility (Cortina et al., 2001). Extending these insights to vocal delivery, a condescending tone may similarly project superiority, signal exclusion, and erode a sense of belonging. In some cases, it may even be experienced as subtle aggression, particularly among individuals from marginalised groups (Perez Almendros & Schockaert, 2022). Therefore, by contrasting praising and condescending tones while keeping verbal content constant, the present study examines how these evaluative vocal styles shape motivational and emotional outcomes in workplace communication.

Present research

The present studies are designed to examine how praising and condescending tones of voice influence key outcomes in workplace settings: wellbeing, work commitment, and flourishing potentials. Flourishing, particularly the accomplishment and engagement subscales, is a focus because prior research has shown that employees' flourishing correlates with work performance and overall organisational outcomes (Donaldson et al., 2024). Similarly, organisational commitment is known to be shaped by leaders'

communication styles (Brown et al., 2019; Mikkelson et al., 2015), making managers' tone of voice a particularly relevant factor to investigate.

In addition to tone, individual differences in self-esteem are included as a predictor because prior studies show that self-esteem shapes resilience, affective responses, and reactions to feedback (see review Heimpel et al., 2002; Orth & Robins, 2014). This also allows the study to test whether the impact of tone of voice is consistent across listeners or moderated by individual differences in emotional regulation.

Hypotheses

We predict that tone of voice will influence listeners' motivational and emotional outcomes in the workplace. Specifically:

H1: Listening to praising tones of voice, compared to condescending tones, will increase listeners' feelings of relatedness.

H2: Listening to praising tones of voice, compared to condescending tones, will enhance listeners' self-reported wellbeing.

H3: Listening to praising tones of voice, compared to condescending tones, will increase listeners' work commitment.

H4: Listening to praising tones of voice, compared to condescending tones, will enhance listeners' flourishing potentials, including accomplishment and engagement.

H5: Individuals with higher self-esteem will benefit more from praising tones of voice, showing greater increases in relatedness, wellbeing, work commitment, and flourishing potentials, compared to individuals with lower self-esteem.

Self-esteem is conceptualised as a moderator of the effects of tone of voice. Specifically, individuals with higher self-esteem are expected to derive greater benefit from praising

tones of voice, showing an increase in relatedness, wellbeing, and work commitment. By contrast, individuals with lower self-esteem may be less responsive to praise and more sensitive to discouraging tones, such that self-esteem shapes the psychological impact of both positive and negative-valence tone of voice.

Methods

The ethics for this study were approved by the Ethics Subcommittee-3 of the University of Essex (ETH2223-1525).

Stimuli development

Four speakers (two males and two females; 27 – 53 years old with English as their native language) were recruited to create the stimuli. Speakers were instructed to record a wider range of materials, imagining that they were directly addressing another person. To help speakers achieve a realistic impression of the desired voice patterns, they were instructed to imagine themselves in different situations, for example, when talking with a colleague, sibling or mentee. For the current study, only materials that could be used in a work context were selected.

When recording a *praising voice*, *s*peakers were instructed to imagine speaking to someone they admire for their intellect and innovative ideas. They were to show genuine admiration and support for the person's contributions. In contrast, when using a *condescending voice*, speakers were asked to imagine speaking to someone they do not value at all, unworthy of respect and whose ideas are always unhelpful. The goal was to convey a sense of superiority while devaluing the other person and making them feel small and insignificant. They repeated the recordings multiple times until they were

satisfied with the result and achieved the intended tone of voice. No instructions on how to sound exactly were given by experimenters.

During the recording, 29 sentences were spoken in both voice conditions (e.g., "*That's an interesting way to do it*", "*I actually like that idea*", and "Y*ou always have the right answer*"). A full list of sentences is included in the Appendix C.

Validation

Participants listened to either the praising or condescending voices of two speakers at a time (due to the number of recordings) and rated 58 sentences (29 sentences per speaker) in a between-subjects design.

For the praising voices, participants rated on a scale from 1 (not at all) to 7 (very much) whether materials sounded appreciative, admiring, and expressed recognition for them and their actions. For the condescending voices, participants rated on a scale from 1 (not at all) to 7 (very much) whether materials sounded condescending and made them or their actions feel inferior.

From the four speakers, only two were selected for this study (one male and one female, 53 and 45 years old, respectively). Selection was based on the highest mean scores: Female speaker: condescending (M = 4.58, SD = 0.35) and praising (M = 4.53, SD = 0.23); Male speaker: condescending (M = 4.62, SD = 0.42) and praising (M = 4.52, SD = 0.29). The table below shows the acoustic analysis for the two speakers.

Table 14 Acoustic Analysis for the Praising and Condescending Voice

Voice condition	***Acoustic parameters***			
	Fundamental frequency, F0 (Hz)	Speech rate (seconds)	LTAS (dB)	CPP (dB)
Praising	209.20	2.85	-2.32	27.48
Condescending	153.83	2.73	-4.27	28.14

Participants

Using the G-Power sample size calculation, 283 participants were recruited via Prolific to participate in an online study. The sample size was meant to achieve 95% power to detect a small effect size (f = .21). The 283 participants (146 males, 137 females) resided in the UK and were between 19-70 years old (*M* = 39.35, *SD* = 11.06). Participants were either working full-time (211) or part-time (72) and were white (212), black (36), Asian (26) or of mixed races (10).

Procedure

Participants were randomly assigned to either tone of voice condition (condescending or praising). At the start of the experiment, participants completed the demographic section of the online survey. An audio check was conducted to confirm they could hear the materials. Next, they rated their state self-esteem, followed by detailed instructions about the study, which explained that they would first listen to audio recordings of speakers asking them a series of questions. Participants were asked to imagine being at work and that the line manager was speaking to them. They were instructed to pay attention to how

the speakers addressed them and that their task was to answer multiple questions around how each voice made them feel after listening to it.

Survey

Self-Esteem. Participants rated their self-esteem from the 10-item Self-Esteem Rosenberg scale (Rosenberg, 2006) on a scale from 1 (strongly disagree) to 7 (strongly agree). All the items were taken exactly like the original scale, with 4 items being reversed recoded: “At times, I think I am no good at all”, “I do not have much to be proud of”, “I certainly feel useless at times”, “All in all, I am inclined to feel that I am a failure”. Internal consistency was high, α = .930, and the items were averaged for an overall score reflecting participants’ sense of self-esteem.

Relatedness. Participants responded to three items taken from the relatedness subscale of the IMI (Ryan, Mims & Koestner, 2016), which asked about their perceived closeness to their managers using the same prompt that had been used throughout: “Think back to what your manager just said. Do you feel that your manager…” and included items: “cares about you?”, “understands how you feel?”, and “values your opinions and abilities?” (α = .973).

Positive and Negative Affect. To measure both positive and negative affect, we adapted items from Watson et al. (1988). Participants responded in terms of their positive (happy, energetic, interested, pleased) and negative (angry, distressed, irritable, disinterested) affects. As the reliability of a 4-item composite score was high (α = .977), they were

compiled to create an average score of positive affect. Similarly, the 4-item composite score was also high (α =.951), they were compiled for an average score of negative affect.

Affective Work Commitment. To measure participants' commitment to their manager and task at hand, we took subscales from the Workplace Affective Commitment Multidimensional Questionnaire (Perreira et al., 2018). Participants responded to three items about their manager and three items about the task. The prompt used throughout was: "Think back to what your manager just said. To what extent do you agree or disagree with each statement about your manager and your work at this company?" with 3 items about the manager (α =.972): "I like the values conveyed by my manager", "I feel privileged to work with someone like my manager", and "My manager is a great person to work with" and the other 3 items about the task (α =.926): "I find my work stimulating", "I find my work rewarding" and "I do not like being asked to perform in this role".

***Flourishing potentials*.** For *accomplishment* and *engagement*, participants responded to six items taken from the accomplishment and engagement subscale (three items respectively) of the PERMA-Profiler: A brief multidimensional measure of flourishing (Butler & Kern, 2016). The prompt used throughout the survey was "Think back to what your manager just said. How often would each of the following apply to you at this job?" to measure *accomplishment* (α =.971): "I am making progress towards accomplishing my goals", "I am able to handle my responsibilities", "I can achieve the important goals you have set for myself." and *engagement* (α=.963): "I become absorbed in what I am doing",

"I feel excited and interested in things", and "I lose track of time while doing something I enjoy".

In this study, wellbeing is measured using two distinct scales: (1) Positive and Negative Affect and 2) the subscale Accomplishment and Engagement from PERMA.

Results

We used linear regression to predict all seven dependent variables from 1) the main effects of tones of voice or conditions (coded as 0 = condescending, 1 = praising) and self-esteem (centred) and 2) their interaction.

In the main effect model, condition was significantly associated with relatedness ($F(3,279) = 17.50$, $R^2 = .15$, $p < .001$), positive affect ($F(3,279) = 24.67$, $R^2 = .21$, $p < .001$), negative affect ($F(3,279) = 14.21$, $R^2 = .13$, $p < .001$), affective commitment scale for manager ($F(3,279) = 22.43$, $R^2 = .19$, $p < .001$), affective commitment scale for task ($F(3,279) = 21.12$, $R^2 = .18$, $p < .001$), accomplishment ($F(3,279) = 17.37$, $R^2 = .16$, $p < .001$), and engagement ($F(3,279) = 17.01$, $R^2 = .16$, $p < .001$).

Aligned with our hypotheses, participants in the praising voice condition reported feeling significantly more positive (e.g., higher relatedness scores, higher positive affect, increased affective commitment to manager and task, and higher sense of accomplishment and engagement) compared to participants in the condescending voice condition. Self-esteem was found to be a significant predictor across all dependent variables. Participants with higher self-esteem were associated with higher relatedness, greater positive affect, lower negative affect, stronger affective commitment to the

manager and the task, as well as higher levels of accomplishment and engagement. Results are shown in Table 15 below.

Table 15 Regression for Each Dependent Variable (DV) across Conditions and Self-Esteem Scores

DV	***Conditions (0 = Condescending, 1 = Praising)***			***Self-Esteem***		
	B	***t(279)***	***p***	***B***	***t(279)***	***p***
Relatedness	.82	5.76	<.001	.26	3.39	<.001
Positive Affect	1.05	7.39	<.001	.25	3.28	.001
Negative Affect	-.53	-5.27	<.001	-.17	-3.16	.002
Affective Work Commitment (Manager)	1.03	7.25	<.001	.22	2.92	.004
Affective Work Commitment (Task)	.70	6.73	<.001	.17	3.10	.002
Accomplishment	.69	5.63	<.001	.22	3.33	<.001
Engagement	.75	6.37	<.001	.14	2.26	.025

No significant interaction effects between condition and self-esteem were found across any of the dependent variables, suggesting that the impact of the condition on each DV was consistent irrespective of participants' self-esteem levels.

Discussion

This study examined how a praising, compared to a condescending, tone of voice influenced listeners' relatedness to the speaker, wellbeing (positive and negative affect), work commitment (to both manager and task), and flourishing potential (accomplishment and engagement), as well as the moderating role of self-esteem on these outcomes. The results demonstrated clear and consistent effects of tone of voice on psychological and motivational outcomes in a simulated workplace setting. Participants who received feedback in a praising tone of voice reported higher levels of relatedness, positive affect, affective commitment, accomplishment, and engagement, and lower levels of negative affect, compared to participants exposed to a condescending tone. These findings highlight that tone of voice alone has a meaningful impact on how feedback is received and processed.

Participants listening to managers who used a praising voice not only experienced more positive emotions than those who listened to condescending voices, but they also felt more connected to the manager as well as the task. This suggests that task relevance felt can be influenced by the way a manager speaks, supporting ideas put forward in SDT (Ryan & Deci, 2017), which states that environments that support psychological needs (relatedness being one of them) can foster wellbeing and motivation. Our findings suggest that voice cues can shape environments. Specifically, the manager's tone of voice influenced how valued and connected participants felt to them and the task. According to Deci (2005), when the need for relatedness is satisfied, individuals are more likely to internalise workplace goals and act with greater commitment and intrinsic motivation.

Tone of voice, then, acts as a subtle but powerful cue that can affirm one's sense of belonging and psychological safety at work.

Furthermore, the findings also suggest the role of emotional contagion. Participants in the praising voice condition reported significantly more positive outcomes, including feelings of higher relatedness, positive affect, and engagement. This resonates with Barsade's (2002) study on emotional contagion that found that group members exposed to positive emotional contagion (the author mentioned a "strong" tone of voice) experienced enhanced cooperation, fewer disagreements, and improved task performance. Our results suggest that tone of voice, as a form of emotional transmission, not only shapes how people feel but also how they behave and connect. Such evidence highlights the need to train leaders in using positive communication styles while recognising individual differences in emotional receptivity. When managers or team leaders adopt a positive tone of voice, such as praising, they can foster a more supportive climate that strengthens team cohesion, motivation, and commitment.

In contrast, the condescending tone of voice condition triggered consistently poorer outcomes. This highlights the damaging potential of condescending delivery, even when the content itself is neutral. Condescending voices may appear subtle on the surface, but they imply hierarchy, detachment (as instructed to the speakers in the study). Prior research shows that condescending ways of speaking can undermine the positive impact of constructive feedback and result in defensiveness, resentment, and disengagement (Harnish & Bridges, 2011). These ways of speaking often reflect perceived superiority or power imbalances (Perez Almendros & Schockaert, 2022) and in workplace settings, are linked to lower job satisfaction and increased turnover intentions

(Cortina et al., 2001). Moreover, a condescending environment can reduce a sense of belonging and act as a form of subtle aggression, especially for individuals from marginalised groups (Perez Almendros & Schockaert, 2022). These findings support the detrimental effects of a condescending tone of voice in workplace communication, as such interactions can have long-term implications for employee motivation, morale, and overall wellbeing.

Furthermore, self-esteem also played an important role, consistent with past findings showing that participants with higher self-esteem had more constructive emotional and motivational responses (Cameron et al., 2010). However, the main effects of self-esteem occurred independently of tone of voice. Although tone of voice was not correlated with self-esteem differences, findings demonstrate that individual differences contribute to affective responses and behavioural outcomes, suggesting that regardless of how someone speaks, individuals with higher self-esteem tend to experience more positive emotions and maintain constructive motivational orientations.

A key strength of the present research lies in its contribution to the emerging motivational prosody literature. While previous studies have focused primarily on autonomy-supportive and controlling tones (Paulmann & Weinstein, 2023; Wolff & Brechmann, 2015), this study provides empirical evidence that praising is another tone of voice capable of motivating listeners by increasing their commitment to work and being engaged in it. Methodologically, the study isolates the effect of tone by holding verbal content constant, demonstrating that the same words such as "*That's amazing*" or "*You have done a wonderful job again*" can be communicated in either a praising or condescending manner, and that these subtle differences in delivery significantly shape

listeners' behavioural outcomes, relational perceptions, and wellbeing. This approach underscores that praise, even when delivered purely through tone, is more than a simple social reinforcement; it functions as a powerful motivator in workplace contexts.

Conclusion

In summary, this study shows that a manager's tone of voice, particularly praising versus condescending, has clear effects on employees' wellbeing, motivation, and engagement. Praising tones foster relatedness, commitment, and positive affect, while condescending tones undermine them. These effects occur regardless of self-esteem, highlighting the universal power of tone. Beyond what is said, how feedback is delivered can support or thwart psychological needs, making tone a simple yet powerful tool for shaping workplace connection and motivation. Therefore, this study offers clear implications for leaders, managers, and organisations seeking to create more supportive and effective communication environments just through modulating the tone of voice. These findings also highlight the importance of not only what is said in evaluative contexts, but also the way the message is delivered.

3.3 How Encouraging and Critical Tones of Voice Impact Wellbeing and Work Commitment

> A word of encouragement from a teacher to a child can change his life. A word of encouragement from a spouse can save a marriage. A word of encouragement from a leader can inspire a person to reach her potential." (Maxwell, 2008)

Introduction

Past studies acknowledged the effects of encouragement in providing support (Belkhiria et al., 2018; Guyatt et al., 1984; McNair et al., 1996; Nasar et al., 2025), presumably including using an encouraging tone of voice, although an encouraging tone was not explicitly stated. Research often equates an encouraging tone with encouraging words, though it can be argued that encouraging words may not always sound encouraging because previous prosody studies have shown that the same words can be perceived differently by listeners. For instance, the same lexical-semantics can sound either interested or uninterested (see Shamshun Baharin et al., 2024), as it is the tone of voice that makes a difference. Despite established studies on the importance of encouragement (c.f. Wong, 2015; Wong et al, 2025), to date, little is known about the role of tone of voice in showing encouragement, or in other words, the intention to encourage through the tone of voice (categorised as attitudinal or motivational prosody). What is an encouraging tone of voice, and how does it impact the listeners? The current research aims to address this gap by systematically investigating the effects of an encouraging tone of voice, focusing on a work context, and providing acoustic characteristics of an encouraging tone of voice.

Evidence from adjacent literatures demonstrates that variations in tone of voice can shape listeners' wellbeing and behaviour. For instance, mothers' motivating tone of voice through autonomy-supportive tones was found to facilitate adolescents' positive personal outcomes (perceived choice and wellbeing) and prosocial behaviours (Weinstein et al., 2017). Teachers' controlling tone of voice obstructed pupils' intentions to share achievements and secrets, while autonomy-supportive tone of voice fulfilled pupils' closeness and autonomy (Paulmann & Weinstein, 2022). Moreover, a recent study within the education context (Paulmann & Weinstein, 2025) demonstrated that teachers' vocal awareness, through motivating tones of voice, including an encouraging tone, can alter classroom communications. However, the influence of an encouraging tone on listeners' work commitment and affective states remains relatively unexplored.

Past studies have shown that some of the most common issues in organisations involve poor communication, often leading to unresolved conflict and tension (Brower & Darrington, 2012; Edmondson, 1993; Janiukštis et al., 2024), which could plausibly stem from ineffective use of tone of voice, among other factors. When employees perceive the environment to be psychologically unsafe, they may choose silence, which can be harmful to both individual and organisational wellbeing (Sánchez-Gordón et al., 2023). One way to foster an environment that is able to allow employees to grow and flourish at work is through psychological safety, which has been identified as the number one characteristic of successful high-performing teams (Newman et al., 2017). When psychological safety is felt, professionals see more value in others who speak up (Weiss et al., n.d.). Building on this, how far do we know if employees' psychological safety (i.e., wellbeing) can be nurtured just through leaders' encouraging voices to boost their confidence and develop

positive wellbeing? Would just the tone of voice make employees feel encouraged to not only engage and commit to their work but also achieve meaningful work output? Building on this, the current study examines how leaders' encouraging tone of voice would influence employees' psychological safety (i.e., wellbeing) to investigate whether the tone of voice can make employees feel encouraged to not only engage and commit to their work but and also achieve meaningful work output (i.e.: flourish).

The Art of Encouragement

Encouraging words do not just uplift; they also keep the recipients going through challenging times. While the languages used (semantics) are important, the delivery message through the tone of voice equally holds substantial power. Encouraging languages were found to motivate mental health survivors to find motivation, inspiration, and comfort to heal; and users subjective wellbeing were enhanced through a 15-day conversation, even with a robot (Xiang et al., 2025). For example, an encouraging tone as experienced in the workplace, might be able to invite openness, persistence, or emotional safety, while a critical tone may evoke defensiveness, shame, or withdrawal. Yet, while we intuitively accept the power of voice in these contexts, very little empirical work has been carried out in this context. We know, however, that encouraging language more broadly (e.g., the words used) can have powerful effects. For instance, past work has shown that encouraging word choice can help to motivate, inspire, or comfort in various contexts, including to mental health survivors (Aviva & Widyastuti, 2022) and mothers in labour comforted and at eased with a companion offering encouraging words (Nasar et al., 2025).

Despite its commonness, encouragement is understudied in the field of social and positive psychology. Wong (2025) argued that the psychology of encouragement lacks clear boundaries and a theoretical framework. The author continued to define the construct of encouragement from various encouragement and social psychologists as an expression of affirmations, a form of social support, and verbal persuasion. The Tripartite Encouragement Model (TEM), developed by Wong, provides a structured understanding of how encouragement operates in practice. According to TEM, effective encouragement requires careful framing of the message, the trustworthiness of the person giving it, and the credibility of the content. Building on this, an encouraging tone of voice, then, may be the missing link that communicates an encouraging message, builds closeness with the speaker, particularly when delivering messages intended to inspire action at the workplace.

To date, what we know about encouraging communication mostly comes from studies on motivating language, social influence, and verbal encouragement in sports and work. For example, verbal encouragement can boost physical performance by up to 8% (McNair et al., 1996) increase employees' confidence in their abilities (Mayfield & Mayfield, 2019) and leaders' motivating language has also been linked to innovative behaviour (Usmanova et al., 2021). However, these studies did not isolate the tone of voice or the delivery message, only examined the content of the language. This leaves open the question: can the same words produce different outcomes depending on whether they're spoken in an encouraging or critical tone? Addressing this gap is particularly important in organisational contexts, where adults spend a substantial

proportion of their lives at work and where communication dynamics have significant implications for well-being and performance (Lin et al., 2020; Zhu, 2024).

In organisational life, encouragement through the voice (Wong, 2015) could signal psychological safety. For instance, when leaders cultivate a supportive and constructive workplace atmosphere through the use of motivational or encouraging language, it results in favourable employee outcomes, including enhanced job performance, occupational wellbeing, and creativity (Zhu, 2024). In recent years, lots of problems can arise from working within the same group of people or large organisational structures, stemming from differences in communication styles, conflicting goals, or perceived inequities in treatment (Gates & Mark, 2012) all of which could be exacerbated by the tone of voice used in interpersonal interactions.

On the flip side of encouragement, leaders being critical can risk employees' self-efficacy and work performance, particularly when criticism is destructive rather than constructive (Leung et al., 2001). There is a paradox in the research on being "critical." Scholars in critical social science argue that critique can be constructive, helping people question assumptions and spark change (Carr, 2006). However, feedback that feels destructive tends to trigger defensiveness and undermine trust (Leung et al., 2001; Raver et al., 2012), presumably when the tone is harsher. Moreover, our current study investigating encouraging versus critical tones in the workplace is warranted given the current economic climate, where organisations are increasingly focused on cultivating positive work environments to enhance employee productivity, retention, and overall organisational success (Jiang & Wei, 2024; Sears et al., 2013). Workplace support and wellbeing also have an impact on the safety performance of the workplace (Lin et al.,

2020), particularly within the current unstable economic climate, more organisations are forced to reduce monetary spending for incentives, promotion, and hiring with the current economic climate. This means less encouragement for employees' morale. What if encouragement does not need to be through monetary reward only, but simply by using an encouraging tone of voice?

Present research

This study focuses on five key outcomes: *relatedness*, which is the need to feel close and connected (Ryan & Deci, 2000); *positive and negative affect*, which measure the emotional tone of everyday work life (Staw et al., 1994); *work commitment*, reflecting how much people feel dedicated to their manager and tasks (Zhu, 2024); and *accomplishment* and *engagement*, adapted from the PERMA model to measure whether people feel they're progressing and absorbed in what they do (Butler & Kern, 2016). These outcomes could inform us of the influence of managers' tone of voice (encouraging versus critical) on employees' wellbeing, work commitment, and flourishing outcomes. Another relevant predictor is self-esteem. In theory, encouragement should lift self-esteem (Phillips, 1984). However, research on destructive criticism shows that when feedback feels unfair or harsh, even people with high self-esteem can be thrown off, shifting their focus from the task to defending themselves (Raver et al., 2012). The current study explores whether tone of voice interacts with self-esteem to shape these downstream effects. Given the limitations in past work and the current organisational climate, this study aimed to investigate the effects of managers' encouraging versus critical tones of voice on listeners' relatedness, wellbeing, work commitment, and flourishing. We are particularly

interested in understanding how managers' distinct tones of voice impact individuals' psychological states.

Hypotheses

Based on results reported in Paulmann & Weinstein (2022) and findings reported in Study 3.2, we predicted that encouraging tones of voice would increase listeners' feelings of relatedness, as well as enhance their self-reported wellbeing, work commitment, sense of accomplishment, engagement, and self-esteem at the workplace when compared to listening to critical voices.

Methods

The ethics for this study were approved by the Ethics Subcommittee-3 of the University of Essex (ETH2223-1525).

Stimuli development

The same four speakers (27 – 53 years old with English as their native language) recruited for Study 3.2 also recorded materials for this study. Speakers were instructed to record all materials imagining that they were directly addressing another person. To help speakers achieve a realistic impression of the desired voice patterns, they were instructed to imagine themselves talking with a colleague at work.

For the materials that had to be spoken in an encouraging voice, *s*peakers were instructed to imagine speaking to someone they thought had talent but lacked confidence or determination to succeed. They were to encourage and persuade, using a helpful, encouraging tone to improve the individual's effort and confidence. In contrast, when using a critical sounding voice, speakers were asked to imagine speaking to someone

who repeatedly made the same mistakes despite receiving guidance and help. They were instructed to adopt a critical tone that conveyed dissatisfaction, focusing on the person's errors, failings, and shortcomings. They spoke materials multiple times until they were satisfied with the result and felt they had achieved the intended tone of voice. No instructions on how to sound exactly were given by the researcher.

During the recording, 29 sentences were spoken in both voice conditions (e.g., "*Yes, the next step is important*", "*Some things are meant to change*", and "*Practice makes perfect*"). However, for the current study, only 10 sentences were selected from this larger pool to meet the study's requirements. A full list of recorded sentences is included in the Appendix D.

Validation

The validation study employed a between-subjects design in which 30 participants listened to either the encouraging (15 male, 15 female, M_{age}=40.4) or critical sounding voice materials (15 male, 15 female, M_{age}=34.83) for all four speakers (40 short audio recordings for each voice).

For the encouraging voices, participants rated on a scale from 1 (not at all) to 7 (very much) whether speakers sounded encouraging, making them feel supported, uplifted, and reassured, while for the critical voices, participants rated whether materials sounded critical, negative and destructive to them.

From the initially recorded four speakers, only two were selected (one male and one female; 53 and 45 years old respectively) based on the highest mean scores from the validation study. Both, the male (M = 3.81, SD = 0.16) and female speaker were rated to sound encouraging (M = 3.81, SD = 0.35) for materials that were intended to sound

encouraging. Similarly, critical materials spoken by the male (*M* = 4.26, *SD* = 0.19) and female speaker (*M* = 4.69, *SD* = 0.42) were perceived as such. Table 16 shows the acoustic analysis for the two speakers, nicely demonstrating that materials differed acoustically on key variables including fundamental frequency (perceived as pitch), speech rate, and voice quality indicators.

Table 16 Acoustic Analysis for the Encouraging and Critical Voice

Voice condition	***Acoustic parameters***			
	Fundamental frequency, F0 (Hz)	Speech rate (seconds)	LTAS (dB)	CPP (dB)
Encouraging	181.41	3.34	-2.43	28.77
Critical	222.65	3.06	-2.17	29.38

Participants

Using G-Power sample size calculation, 177 participants were recruited via Prolific to achieve a 95% power for a small effect size (f^2 = .10). A between-subject design was employed for this study. The final sample was composed of 87 males, 85 females, 1 non-binary, and 4 prefer not to say with 133 whites, 20 black, 17 Asian and 7 mixed races. Participants were based in the UK, above 18 years old, working full-time (126) or part-time (51). Participants' ages ranged from 18-69 years, with *M* = 36.84 *SD* = 11.38.

Procedure

This study followed the same procedure as Study 3.2. Participants were randomly assigned to either voice condition (encouraging or critical). At the start of the experiment, participants completed the demographic section of the online survey. An audio check followed to confirm they could hear materials. Next, they rated their perceived self-

esteem, followed by detailed instructions about the study, which explained that they would first listen to audio recordings of speakers asking them a series of questions. Participants were asked to imagine being at work and that their line manager was speaking to them. They were instructed to pay attention to how the speakers addressed them and that their task was to answer multiple questions about how each voice made them feel after listening to it.

Survey

Self-esteem. Participants rated their self-esteem from the 10-item Self-Esteem Rosenberg scale (Rosenberg, 2006) on a scale from 1 (strongly disagree) to 7 (strongly agree). All of the items were taken exactly like the original scale with 4 items being reversed recode: “At times, I think I am no good at all,”, “I do not have much to be proud of.”, “I certainly feel useless at times”, “All in all, I am inclined to feel that I am a failure”. Internal consistency was high, α = .927, and the items were averaged for an overall score reflecting participants’ sense of self-esteem.

Relatedness. Participants responded to three items taken from the relatedness subscale of the Intrinsic Motivation Inventory (Ryan et al., 2016), which asked about their perceived closeness to their managers using the same prompt that had been used throughout: “Think back to what your manager just said. Do you feel that your manager…” and included items: “cares about you?”, “understands how you feel?”, and “values your opinions and abilities?” (α = .966).

Positive and Negative Affect. To measure both positive and negative affect, we adapted items from Watson et al. (1988). Participants responded in terms of their positive (happy, energetic, interested, pleased) and negative (angry, distressed, irritable, disinterested) affects. As the reliability of a 4-item composite score was high (α = .963), they were compiled to create an average score of positive affect. Similarly, the 4-item composite score was also high (α = .948), they were compiled for an average score of negative affect.

Affective Work Commitment. To measure participants' commitment to their manager and task at hand, we took subscales from the Workplace Affective Commitment Multidimensional Questionnaire (Perreira et al., 2018). Participants responded to three items about their manager and three items about the task. The prompt used throughout was: "Think back to what your manager just said. To what extent do you agree or disagree with each statement about your manager and your work at this company?" with 3 items about the manager (α = .969): "I like the values conveyed by my manager", "I feel privileged to work with someone like my manager", and "My manager is a great person to work with" and the other 3 items about the task (α = .913): "I find my work stimulating", "I find my work rewarding" and "I do not like being asked to perform in this role".

***PERMA*.** For *accomplishment* and *engagement*, participants responded to six items taken from the accomplishment and engagement subscale (three items respectively) of the PERMA-Profiler: A brief multidimensional measure of flourishing (Butler & Kern, 2016). The prompt used throughout the survey was "Think back to what your manager just said…

How often would each of the following apply to you at this job?" to measure *accomplishment* (α = .966): "I am making progress towards accomplishing my goals", "I am able to handle my responsibilities", "I can achieve the important goals you have set for myself." and *engagement* (α = .963): "I become absorbed in what I am doing", "I feel excited and interested in things", and "I lose track of time while doing something I enjoy".

Results

A linear regression was employed to predict seven dependent variables (relatedness, positive affect, negative affect, affective work commitment to manager, affective work commitment to task, accomplishment and engagement) from 1) condition (coded as 0= critical voice, 1 = encouraging voice) and self-esteem (mean-centred) and 2) their two-way interaction between condition and self-esteem.

In the main effect models, condition significantly predicted relatedness ($F(3,173) = 5.99$, $R^2 = .09$, $p < .001$); positive affect ($F(3,173) = 4.17$, $R^2 = .07$, $p = .007$); negative affect ($F(3,173) = 4.38$, $R^2 = .07$, $p = .005$), affective work commitment to manager ($F(3,173) = 5.64$, $R^2 = .09$, $p = .001$), affective work commitment to task ($F(3,173) = 3.45$, $R^2 = .06$, $p = .018$), accomplishment ($F(3,173) = 4.99$, $R^2 = .08$, $p = .002$), and engagement ($F(3,173) = 3.42$, $R^2 = .06$, $p = .019$).

No significant interaction effects were found between condition and self-esteem across any outcome variable, suggesting that the effects of condition were consistent irrespective of participants' self-esteem levels.

Aligned with the hypothesis, participants in the encouraging voice condition reported significantly higher scores than those in the critical voice condition for four outcomes: relatedness, affective commitment to manager, affective commitment to task

and (marginally) positive affect. Encouraging voices also elicited significantly lower scores for negative affect. No significant differences were observed for accomplishment or engagement. Results are shown in Table 17.

Table 17 Regression for Each Dependent Variable across Conditions and Self-Esteem Scores

DV	***Conditions (0= Critical, 1=Encouraging)***			***Self-Esteem***			***Conditions x Self-Esteem***		
	B	t(173)	*p*	B	t(173)	*p*	B	t(173)	*p*
Relatedness	.48	2.88	.005	.23	2.28	.024	.03	.22	.824
Positive Affect	.27	1.86	.066	.19	2.39	.018	-.02	-.16	.874
Negative Affect	-.44	-2.91	.004	-.12	-1.42	.157	-.06	-.45	.651
Affective Work Commitment (Manager)	.49	2.95	.004	.21	2.19	.030	.02	.12	.908
Affective Work Commitment (Task)	.29	2.31	.022	.08	1.11	.27	.08	.79	.426
Accomplishment	.25	1.48	.141	.24	2.56	.011	.02	.11	.909
Engagement	.22	1.30	.196	.14	1.43	.15	.12	.91	.365

Discussion

This study examined how managers' encouraging versus critical tones of voice influence employees' wellbeing and work-related outcomes. Overall, an encouraging tone was associated with higher relatedness and greater affective work commitment (both to the

manager and the task), whereas critical tones produced the opposite pattern. In contrast, flourishing outcomes, such as accomplishment and engagement, were not significantly affected by vocal tone. These findings demonstrate that tone of voice alone can meaningfully shape employees' perceptions and behaviours at work, even when the verbal content of the message remains constant. The results align with broader research on social influence and motivational prosody (Jiang et al., 2024; Paulmann & Weinstein, 2023; Vrijders et al., 2024; Weinstein et al., 2018, 2019) and highlight how critical feedback delivered through tone of voice can undermine wellbeing and reduce work commitment.

The current findings highlight that the way others talk can significantly affect listeners' self-reported wellbeing (e.g., decreased negative affect when listening to an encouraging tone of voice), relationships with the speaker (e.g., feeling less close to managers who use critical voices) and commitment to work itself (the manager and given tasks). Listening to a manager saying "practice makes perfect" or "you'll get there if you put in the effort" in an encouraging tone of voice elicited less negative affect, feeling closer to the speaker, and increased work commitment, as opposed to when listening to the same sentence in a critical tone of voice. This suggests that vocal tone alone can enhance perceptions of social connection, even in brief interactions. These findings extend prior motivational prosody work (Paulmann & Weinstein, 2023; Weinstein et al., 2018) by demonstrating that encouraging vocal tones not only affect emotional states but also relational perceptions and work commitment. Contrastingly, previous studies in high-stakes or critical feedback contexts sometimes found that even critical tones can increase perceived relatedness when they signal investment (Carr, 2006). However, in the present

study, encouraging voices consistently outperformed critical voices, suggesting that the valence of tone is more influential in this context.

Listeners reported higher affective commitment toward both the manager and the task after listening to an encouraging tone of voice could be explained and contextualised by research on verbal encouragement in physical and performance contexts. For example, encouraging statements have been shown to increase peak force by 5–8%, suggesting that motivating language can yield tangible improvements in performance (McNair et al., 1996). Our study extends this evidence to the workplace, demonstrating that employees perceive greater commitment to the task (e.g., finding work stimulating and rewarding), as well as commitment to the manager (e.g., feeling privileged to work with the manager and liking the values conveyed by the manager), through the influence of an encouraging tone of voice. Moreover, using an encouraging tone also aligns with research indicating that positive attitudes experienced and expressed at work can lead to favourable outcomes, including higher work achievement and a more supportive social context (Staw et al., 1994), complements recent findings showing that leader motivating language enhances employee self-efficacy and performance (Mayfield et al., 2024).

Additionally, managers' encouraging tone of voice associated with multiple positive relational outcomes, such as closeness to the speaker, could be informed by the psychology of encouragement theory (Wong, 2015). The results are consistent with the Tripartite Encouragement Model, which emphasises that the framing and delivery of encouragement messages are important for eliciting positive outcomes. In the current study, manipulating vocal tone provided an operational test of this principle, showing that

delivery alone, without changing the content of the message, can in fact, strengthen relational and motivational experiences at work. Moreover, our findings resonate with research on motivating language in organisational contexts, which links leaders' verbal strategies with positive employee outcomes such as innovative work behaviour (Usmanova et al., 2021). In that study, motivating language was defined as verbal communication that supports employees by reducing uncertainty through direction-giving, empathetic, and meaning-making language. Together, this suggests that managers' encouraging tone may function similarly, providing relational and motivational cues that enhance employees' engagement and perceived support.

Drawing on Cialdini and Griskevicius (2010), the authors suggest that an encouraging tone may implicitly tap into social validation cues. For instance, when managers use encouraging language that conveys belief in an employee's ability to succeed, it may remind employees of prior successes and support their sense of belonging. While we did not directly measure these mechanisms, such processes provide a parallel theoretical perspective for understanding the higher relatedness and reduced negative affect observed in the encouraging voice condition. Furthermore, prior research indicates that leaders' tone of voice can contribute to a healthy workplace culture that fosters wellbeing and positive interactions among colleagues (van der Put et al., 2021), offering additional context for our findings.

Critical tone of voice

In contrast, the impact of a critical tone of voice highlights the potential risks when feedback is delivered poorly, even with the same messaging used in the encouraging

tone of voice. Leung et al. (2001) found that employees are more likely to accept critical feedback when it is delivered with interpersonal fairness. However, when fairness is low, recipients are more inclined to make negative dispositional attributions about their supervisor's intent and to feel less trust. These processes can help explain why participants exposed to a critical voice reported lower relatedness and reduced positive affect while an increase in negative affect. Rather than seeing the feedback as fair guidance, they may have experienced it as an interpersonal threat. Furthermore, harsh criticism hurts performance. Raver et al. (2012) showed that it increases anger and defensiveness, hindering focus on tasks. This aligns with the Feedback Intervention Theory (Kluger & DeNisi, 1996), where poor criticism shifts attention to the self. Our study confirms this: a critical tone increased negative affect, reduce closeness and work commitment, even with the same message.

Self-esteem

The consistent lack of interaction with self-esteem across conditions further suggests that the relational harm of a harsh tone impacts across individual perceived self-esteem differences. While trait competitiveness can sometimes moderate responses to destructive criticism, the negative impact of a critical tone may overwhelm any effects of self-esteem (Fong et al., 2018). Self-esteem was included as a predictor to investigate whether individual differences in self-evaluation moderate the perception of social signals in the voice. Individuals with higher self-esteem is hypothesised to demonstrate greater sensitivity to encouraging vocal cues. Conversely, those with lower self-esteem could facilitate a heightened sensitivity to critical tones, potentially serving as an early-warning

system for social rejection. By adding self-esteem to the second model, the analysis sought to determine if these internal self-evaluations account for significant variance in how participants respond to differing vocal conditions beyond the main effects of the manipulations themselves.

The current study extends research on motivational and attitudinal prosody into workplace contexts. While prior work in parenting contexts demonstrated that autonomy-supportive tones can enhance engagement (Paulmann et al., 2019), our findings show that an encouraging tone of voice at work similarly promotes desirable outcomes, including higher commitment to both the manager and the task. In contrast, a critical tone (comparable to the controlling tone in prior research) undermines these positive outcomes, as evidenced by reduced relatedness and work commitment.

Overall, these results align with a wide body of evidence highlighting the relational nature of feedback. Encouraging tones appear to foster closeness and increased work commitment, whereas critical tones can have the opposite effect if not delivered with care and fairness. This supports the argument that motivating language is a key resource for innovative, resilient organisational cultures (Usmanova et al., 2022). It is not just *what* is said but *how* it is said that matters.

Conclusion

The current study highlights the subtle yet powerful effects of managers' encouraging tone of voice on employees' feeling related, commitment to work, and potential to flourish as opposed to when managers sounds critical through the tone of voice. The findings also

demonstrates the importance for managers to be mindful of their tone, ensuring feedback and communication is perceived as supportive rather than undermining (Ciancetta & Roch, 2021; Nasar et al., 2025). Future research should investigate specific training interventions that enhance managers' ability to create a supportive working culture, including delivering constructive criticism effectively, simply by modulating the tone of voice for feedback. Specifically, exploring the balance between critical and encouraging feedback within performance reviews could yield valuable insights.

CHAPTER 4

EVERYDAY TONES OF VOICE: EXPLORING WORK, HEALTHCARE, AND EDUCATIONAL CONTEXTS

Background

The objective of this chapter is to investigate tones of voice in real-world applied situations. The three selected applied contexts are: workplace (expanding from the previous chapter), healthcare (expanding from Chapter 2) and education (using recordings from naturalistic interactions). This chapter combines the main outcomes investigated throughout this thesis, namely, self-disclosure and wellbeing. First, Study 4.1 investigates all the combined four tone of voice patterns examined in previous studies (Study 3.2 and 3.3) within a workplace context, too. Then, Study 4.2 examines interested-sounding and uninterested-sounding tones of the general practitioners (GPs) on patients' behavioural outcomes. Lastly, Study 4.3 analysed teachers' acoustic features in one-to-one interactions with students. This chapter further extends the tones of voice effects in applied contexts, thus consolidating the power and influence of the paralinguistic communication through the tone of voice.

Keywords: tone of voice, wellbeing, self-disclosure, workplace, healthcare, education

4.1 Four Vocal Patterns in the Workplace: Helpful or Harmful?

Introduction

In the modern workplace, feedback is key to employee development. Research on feedback in the workplace confirms that *how* feedback is delivered often matters just as much as what is said (Fong et al., 2016; Zhu, 2024). This mirrors findings from the vocal delivery literature, which suggests that the way something is said (or the "tone of voice") can either reinforce or undermine the message being conveyed (Weinstein et al., 2017). This highlights the need to understand how different tones of voice often experienced in the workplace context can affect professional interactions. This is particularly important given findings that show how powerful vocal cues can be. For example, vocal cues can signal a speaker's emotions (Banse & Scherer, 1996; Paulmann & Kotz, 2008), attitudes (Jiang & Pell, 2014; Wickens & Perry, 2015), and motivational intentions (Paulmann et al., 2018; Weinstein et al., 2017) and thereby communicate social intentions beyond the literal words spoken. This study aims to contribute to past work on workplace interactions (Anderson et al., 2001; Staw et al., 1994; Zhu, 2024) by offering specific insights on understanding how managers' vocal tones affect employees' emotional responses, connections to their managers, and willingness to share information, all crucial aspects of workplace interactions (Alba-Juez & Pérez-González, 2019; Earley, 1986; Globočnik Žunac, 2024).

Much of the existing research on workplace communication focuses on feedback (Earley, 1986; Erickson et al., 2022; Sutton et al., 2012). This work often groups feedback

into “constructive” or “destructive” (Baron, 1988; Fong et al., 2016) or “positive” and “negative” categories (Xiao et al., 2021), however, employers and employees’ interactions are not just shaped by giving direct “feedback”. Crucially, this categorical approach and focus overlook how subtle nuances (as conveyed through vocal cues) during conversations might affect employees’ affective states, relationships with each other, and their behaviour in the workplace.

Indeed, there is evidence that different social intentions, when communicated through word choice, leave their mark on an employee. For example, using condescending language with the possible intent to belittle someone was found to trigger a wide range of responses and counterattacks (Holmberg, 2008). Similarly, being criticised made people feel threatened and triggered negative feelings in both individuals and groups (Fletcher, 1986; Leung et al., 2001; Sheikh et al., 2023).

On the contrary, conveying praise (Delin & Baumeister, 1994), has the power to moderate the effects of autonomy on work motivation (Washakowski, 2015) and in education settings (Droe, 2013). Furthermore, research emphasises that encouragement fosters a sense of empowerment and self-efficacy, which can significantly influence behaviour and cognition (Brown & Howard, 2014; Martín-Loeches et al., 2009; Wong et al., 2025). Interestingly, while the effects of social intention communication more broadly seems thus fairly recognised, none of these past studies examined how vocal intentions can affect outcomes.

Beyond the workplace communication literature, the current study will also allow for advancing work on vocal expressions. While, traditionally, prosody work has predominantly focused on how emotions are conveyed (Banse & Scherer, 1996; Kotz &

Paulmann, 2007), the current study goes beyond well defined and explored vocal patterns. Not only that, but the current field in prosody is also heavily focused on exploring the perception and production of prosody separately. Indeed, it seems as if explorations on how a speaker's tone of voice affects how listeners respond verbally, immediately upon listening to different tones of voice, has yet to be explored.

The most current research on speakers' tones of voice and listeners' disclosure was a series of studies conducted to investigate how speakers' interest or uninterested-sounding tones of voice impact listeners' written disclosures across the two cultures (Baharin et al., 2024) and another study on empathic people's intention to disclose (Hanel & Paulmann, 2025). Research shows that a speaker's tone can change how listeners feel and how connected they feel to the speaker (Shamshun Baharin et al., 2024; Weinstein et al., 2019), however, we have yet to explore how this influences what listeners would say (verbally) in response. Some studies suggest that supportive speech can lead to more open and emotional self-expression (Feng, 2015; c.f. Wong, 2015), but these studies do not focus on the specific role of tone of voice in feedback.

Therefore, we do not fully understand how different tones in managerial feedback might affect how connected employees feel and their emotions upon receiving feedback. Research demonstrates that prosody can act like an emotional contagion (Hanel & Paulmann, 2025): listeners "catch" the affect signalled by the speaker's tone, shaping their mood and intention to disclose. This is particularly important in feedback situations where power dynamics and perceived support or criticism play major roles. For example, praising voices could act as a social reinforcement that motivates employees to be more committed to their task and engaged with their work, as shown in a previous study (Study

3.2), investigating the impact of praising voice, thus reinforcing a sense of relatedness to the speaker.

Present research

The present study moves beyond broad "positive vs. negative" categories to examine these four voice patterns in an applied context, focusing on workplace feedback. By investigating how praising, encouraging, condescending, and critical tones shape employees' perceptions of their *relatedness* to managers, their self-rated positive and negative affect, and the *psychological dimensions of their verbal disclosures*, this study addresses a crucial gap in prosody scholarship. It asks not just how people *feel* when they hear different variations of vocal expressions, but how they *respond* to such expressions *verbally*, revealing how prosody may influence communication and the quality of self-disclosure in language and disclosure quality. Importantly, the design of this study simulated interactions rather than just perceiving information. When an employee hears feedback from their manager, they rarely process it passively; they react in ways that reveal their emotional state and sense of connection to the speaker.

This research taps into that dynamic by capturing not only immediate affective responses but also the linguistic meanings of those reactions: word count, authenticity, analytic thinking, and emotional tone (Doyle & Campbell, 2021; Tausczik & Pennebaker, 2009). These insights could help in designing interventions that train managers to use prosody strategically and help them use the prosody that is most effective for employees. In a world where psychological safety and supportive communication are increasingly valued, the nuances of vocal delivery deserve much closer attention.

4.1 Four Vocal Patterns in the Workplace: Helpful or Harmful?

Moving beyond the previous two studies comparing praising with condescending tones of voice and encouraging with critical tones of voice, the current study investigates all four voice patterns together: the impact of employers' praising, encouraging, condescending, and critical voices when speaking to their employees.

Hypotheses

We hypothesise that tone of voice will influence participants' self-rated feelings of relatedness and affect, and the psychological measures of their verbal disclosures.

H1: Participants will feel closer and more related to speakers who use praising and encouraging-sounding voices than to condescending and critical voices.

H2: Tones of voice that sound praising and encouraging elicit higher levels of positive affect in participants than condescending and critical tones of voice.

H3: Condescending and critical-sounding voices will lead to greater reports of negative affect than praising and encouraging voices.

H4: Participants' verbal disclosure will have a greater word count, higher analytic thinking, increased authenticity, more positive emotional tone, greater use of positive emotion words, and affective language when listening to positive-valenced voices (praising and encouraging) and less disclosure in all the dimensions when listening to negative-valenced voices (condescending and critical).

H5: Participants with higher self-esteem will report greater perceived relatedness and positive affect, and lower negative affect, when listening to praising and encouraging tones of voice compared to condescending and critical tones of voice.

Self-esteem was included as a covariate for theoretical reason (Hanel & Paulmann, 2025). Specifically, self-esteem is central to how individuals interpret

interpersonal messages and may shape their responsiveness to the manipulated tone of voice conditions; therefore, accounting for individual differences in self-esteem allowed for a clearer test of Hypothesis 5.

Methods

Ethical approval was granted by Ethics Subcommittee-3 of the University of Essex (ETH2223-1525).

Stimuli development

Using previously validated materials (reported in Chapter 3), this study presented recordings from two speakers (one male and one female, 53 and 45 years old, respectively) across four conditions: *praising, condescending, encouraging,* and *critical* tones of voice. Five sentences from each condition were selected for the current study. For praising and condescending tones of voice, the sentences spoken were: *"Some things are meant to change. It's hard but not impossible. Practice makes perfect. We'll get there if you put in the effort. You should get it right this time"*, while for encouraging and critical tones of voice, the sentences spoken were "*That was fascinating. That's an interesting way to do it. Your confidence is inspiring. You always know what to do. You have done a wonderful job again*".

Participants

A total of 122 participants were recruited through Prolific for each version, giving a total of 244 participants. A sensitivity power analysis conducted in G*Power (α = .05) indicated that, with the recruited sample size, the study had 80% power to detect within-subject effects as small as f = .07 across the four voice conditions. Audio recordings

provided by participants that were inaudible or duplicates were removed during data cleaning, which gave the total of the final participants from both surveys, N = 221 (removed 23). The sample is composed of 112 females, 108 males, and one binary. The mean age of the participants was M_{age} = 38.66 (SD = 10.39) years. There were 170 Whites, 30 Blacks, 18 Asians, and 3 Mixed, with 157 working full-time and 64 working part-time.

Procedure

Employing a within-subjects design, all participants listened to all four voice conditions. Similar to procedures reported before (Chapter 2), participants were invited to complete an online survey which presented participants with voice stimuli before answering a range of questions. Specifically, all participants first completed the demographic section. Next, they ran an audio check by writing down what they had heard from the audio. They then rated their self-esteem state, followed by detailed instructions about the study, which explained that they would first listen to audio recordings of the speakers. Participants were asked to imagine being at work and that their line manager was speaking to them. They were instructed to pay attention to how their managers were speaking to them and to respond to what was said. They had up to one minute to respond. Finally, participants answered survey questions that assessed perceived relatedness and their positive and negative affect as described further below.

Two versions of the study were created to counterbalance speaker-voice pairings. In Version 1, the female speaker delivered praising and condescending conditions, while the male speaker delivered encouraging and critical conditions. In Version 2, these roles were reversed: the male speaker used praising and condescending voices, and the

female speaker used encouraging and critical voices. For the verbal responses to questions, participants were directed to an online recording tool used in previous studies (e.g., Paulmann & Weinstein, 2025) and advised not to speak too close to the microphone and to minimise physical movements while recording. They were also instructed to check the audibility of their recordings with clear guidance provided in the survey. Participants were informed that if their recordings were not audible, they would not be eligible for compensation.

Surveys

Self-esteem. Participants rated their self-esteem on the 10-item Self-Esteem Rosenberg scale (Rosenberg, 2006) on a scale from 1 (strongly disagree) to 7 (strongly agree). All the items were taken exactly like the original scale, with four items being reversed recoded: “At times, I think I am no good at all,”, “I do not have much to be proud of”., “I certainly feel useless at times”, “All in all, I am inclined to feel that I am a failure”. The items were averaged to obtain an overall score reflecting the participants’ sense of self-esteem (α = .924).

Relatedness. Participants responded to three items taken from the relatedness subscale of the Intrinsic Motivation Inventory (Ryan et al., 2016), which asked about their perceived closeness to their managers using the same prompt that had been used throughout: “Think back to what your manager just said. Do you feel that your manager… and include items: ” and included items: “cares about you?”, “understands how you feel?” and “values your opinions and abilities?” (α = .866).

Positive and Negative Affect. To measure both positive and negative affect, we adapted items from Watson et al. (1988). Participants responded in terms of their positive affect (happy, energetic, interested, pleased) with an internal consistency, α = .874 and negative affect (angry, distressed, irritable, disinterested) with an internal consistency, α = .822.

Results

Speakers' Acoustic Analysis

After cleaning and arranging the voice disclosure to match their respective self-ratings, the audio responses of the participants were analysed in VoiceLab to measure their acoustic compositions. Table 18 shows the acoustic characteristics of the participants' verbal disclosures in response to the four voice conditions.

Table 18 Acoustic Analysis of Participants' Responses When Listening to the Four Voice Patterns of the Speakers

Speakers' Voice Conditions	***Acoustic Analysis of Participants' Voice Responses (N= 221)***				
	Mean F0 (Hz)	*Speech rate (seconds)*	*Mean Intensity (dB)*	*CPP* (dB)	*Mean LTAS (dB)*
Praising	163.06	2.74	68.48	34.02	1.37
Condescending	159.37	2.67	68.26	34.22	1.47
Encouraging	158.88	2.76	68.60	34.14	1.82
Critical	155.77	2.78	68.52	34.26	1.66

Note. Pitch was averaged for all 221 participants for each condition, respectively. Speech rate was calculated using the number of syllables in an utterance and dividing this by the utterance duration (in seconds). Similarly, the frequency band range was averaged in each condition. Data are extracted from AudioLab and are available on osf.

The acoustic analysis shows that participants responded with the highest mean pitch (163.06 Hz) in the praising voice condition, followed by condescending (159.37 Hz), encouraging (158.88 Hz), and critical (155.77 Hz) tones of voice. Participants' speech rate was fastest in the critical condition (2.78 seconds) and slowest in the condescending condition (2.67 seconds). Mean intensity, a measure of loudness, remained consistent across all conditions (68–69 dB). CPP (cepstral peak prominence, an index of voice quality and clarity) showed minimal variation, ranging from 34.02 dB (praising) to 34.26 dB (critical). LTAS (long-term average spectrum, reflecting overall spectral energy distribution) was lowest in the praising condition (1.37 dB) and highest in the encouraging condition (1.82 dB). Overall, participants' vocal responses were relatively similar across voice conditions, with only minor shifts in pitch, speech rate, and spectral energy.

Listeners' Behavioural Outcomes

A repeated-measures ANCOVA was conducted to examine the effects of voice condition (condescending, critical, encouraging, praising) on listeners' relatedness, positive affect, and negative affect, with self-esteem included as a covariate.

Relatedness

There was a significant main effect of *Condition*, $F(3, 657) = 183.65$, $p < .001$, $\eta^2p = .46$**,** indicating that relatedness differed across the four voice conditions. Descriptive statistics showed that praising voices elicited the highest relatedness ratings ($M = 5.80$, $SE = .08$), followed by condescending ($M = 4.13$, $SE = .11$), encouraging ($M = 3.82$, $SE = .13$), and critical ($M = 2.82$, $SE = .10$) tones of voices. Pairwise comparisons adjusted using the Benjamini–Hochberg false discovery rate (FDR) procedure revealed that praising voices

were rated significantly higher than encouraging, condescending, and critical voices (all *ps* < .001). Encouraging and condescending voices did not differ significantly from each other ($p = .303$), but both were rated significantly higher than critical voices (both $p < .001$). Collectively, participants rated closeness to the speakers higher after listening to praising voices than condescending voices and encouraging voices than critical voices. The between-subjects effect of self-esteem was significant, $F(1, 219) = 8.11$, $p = .005$, $\eta^2p = .04$, showing that participants with higher self-esteem reported slightly higher relatedness ratings across all voice conditions.

Positive Affect

Similarly, there was a significant main effect of *Condition*, $F(3, 657) = 267.72$, $p < .001$, $\eta^2p = .55$**,** indicating that positive affect differed across the four voice conditions. Descriptive statistics showed that praising voices elicited the highest positive affect ($M = 5.85$, $SE = .08$) on listeners, followed by condescending ($M = 3.79$, $SE = .13$), encouraging ($M = 3.60$, $SE = .10$), and critical ($M = 2.47$, $SE = .08$) tones of voices. Pairwise comparisons adjusted using the Benjamini–Hochberg false discovery rate (FDR) procedure revealed that all conditions differed significantly from each other (all $p < .001$), except for encouraging and condescending voices ($p = 1.0$). The between-subjects effect of self-esteem was significant, $F(1, 219) = 11.77$, $p < .001$, $\eta^2p = .05$**,** indicating that participants with higher self-esteem reported higher positive affect overall.

Negative Affect

Again, there was a significant main effect of *Condition*, $F(3, 657) = 175.98$, $p < .001$, $\eta^2p = .45$ on listeners' negative affect**.** Critical voices elicited the highest negative affect ($M = 3.93$, $SE = .09$), followed by condescending ($M = 2.90$, $SE = .11$), encouraging ($M = 2.75$,

SE = .09), and praising tones of voices (*M* = 1.37, *SE* = .05). Pairwise comparisons adjusted using the Benjamini–Hochberg false discovery rate (FDR) procedure indicated that all differences were significant ($p < .001$), except for encouraging and condescending voices ($p = 1.0$). The between-subjects effect of self-esteem was significant, $F(1, 219) = 20.63$, $p < .001$, $\eta^2p = .09$, indicating that participants with higher self-esteem reported lower negative affect overall.

Two-way interaction *Self-Esteem x Condition* was not significant in any of the dependent variables: relatedness ($p = .81$), positive affect ($p = .68$), and negative affect ($p = .71$).

Notably, although the design of this study was within-subjects, these comparisons should be interpreted between comparable tones (i.e., differing tones with the same sentences), specifically, praising versus condescending tones and encouraging versus critical tones. Therefore, the observed effects across all four voice conditions may reflect both tone and sentence content.

Disclosure Analysis

Following previous analyses (Chapter 2), we used LIWC software to analyse participants' verbal disclosures across the four voice conditions, focusing on 10 linguistic dimensions: *Word Count, Analytical Thinking, Authenticity, Tone, Affect, Linguistic, Positive Tone, Negative Tone, Positive Emotion*, and *Negative Emotion*. For each LIWC variable, a repeated-measures ANOVA was conducted with voice condition as the within-subject factor. For a more detailed disclosure score, the positive and negative tones and emotions were also analysed (which are subsets of the overall "*Tone*" within the LIWC software).

Word Count

There was a significant main effect of *Condition* on *Word Count*, $F(3, 660) = 11.12$, $p < .001$, $\eta^2_p = .05$, indicating that the number of words participants used differed when responding to the four voice conditions. Post-hoc pairwise comparisons showed that participants responded with more words in response to critical voices ($M = 38.16$, $SE = 1.69$) and encouraging ($M = 37.51$, $SE = 1.62$) than praising ($M = 32.67$, $SE = 1.63$) and condescending voices ($M = 33.64$, $SE = 1.64$), all $ps < .001$ except for praising and condescending ($p = .405$) and encouraging and critical ($p = .548$).

Tone

There was a main effect of *Condition* for *Tone*, $F(3, 660) = 33.94$, $p < .001$, $\eta^2_p = .13$, suggesting that the tone of the verbal disclosure differs across all four voice conditions. Post-hoc pairwise comparisons showed that participants responded with tone signifying emotional valence in response to praising ($M = 95.92$, $SE = .84$), followed by condescending ($M = 87.47$, $SE = 1.79$), encouraging ($M = 83.55$, $SE = 1.88$) and critical voices ($M = 73.69$, $SE = 2.19$) with all $ps < .001$, except for encouraging and condescending voices.

Affect

Similarly, participants' *Affect* also varied significantly by *Condition*, $F(3, 660) = 61.40$, $p < .001$, $\eta^2_p = .22$, showing that affective languages used in the disclosure vary across all four voice conditions. Post-hoc pairwise comparisons showed that participants responded using affective languages in their disclosure after listening to praising ($M = 16.57$, $SE = .67$), followed by condescending ($M = 15.30$, $SE = .66$), encouraging ($M = 9.89$, *SE*

= .46) and critical voices (*M* = 8.44, *SE* = .44) with all *ps* < .05, except for praising and condescending voices.

Positive Tone and Positive Emotion

Positive Tone ($F(3, 660) = 66.46$, $p < .001$, $\eta^2_p = .23$) and *Positive Emotion* words ($F(3, 660) = 63.96$, $p < .001$, $\eta^2_p = .23$) were both significantly influenced by the voice condition. Post-hoc pairwise comparisons showed that participants responded using positive tones in their disclosure after listening to praising (*M* = 16.28, *SE* = .67), followed by condescending (*M* = 14.28, *SE* = .67), encouraging (*M* = 9.48, *SE* = .46) and critical voices (*M* = 7.31, *SE* = .41) with all *ps* < .05. Similarly, post-hoc pairwise comparisons showed that participants responded using positive emotions in their disclosure after listening to praising (*M* = 5.41, *SE* = .32), followed by condescending (*M* = 4.72, *SE* = .31), encouraging (*M* = 1.98, *SE* = .20) and critical voices (*M* = 1.59, *SE* = .16) with all *ps* < .05.

Negative Tone and Negative Emotion

Negative Tone and Negative Emotion words also showed significant main effects across *Conditions*, $F(3, 660) = 7.98$, $p < .001$, $\eta^2_p = .04$ and $F(3, 660) = 6.92$, $p < .001$, $\eta^2_p = .03$, respectively, suggesting that condescending and critical voices prompted slightly more negative expressions. Post-hoc pairwise comparisons showed that participants' disclosure using negative tone was the highest in the condescending (*M* = .95, *SE* = .18), followed by critical (*M* = .83, *SE* = .11), encouraging (*M* = .39, *SE* = .09) and praising voice condition (*M* = .23, *SE* = .07) with all *ps* <.05 except for the praising and encouraging; condescending and critical voices. Similarly, post-hoc pairwise comparisons showed that participants' disclosure using negative emotion was also the

highest in the condescending (*M* = .63, *SE* = .16), followed by critical (*M* = .32, *SE* = .07), encouraging (*M* = .15, *SE* = .06) and praising voice condition (*M* = .08, *SE* = .03) with all *ps* < .05, also except for the praising and encouraging; condescending and critical voices.

Other Linguistic Dimensions

No significant main effects of condition were found for Analytic Thinking (*p* = .16), Authentic Thinking (*p* = .08), or Linguistic Complexity (*p* = .07).

The use of non-corrected tests is justified because the dependent variables represent a priori test. In particular, they reflect conceptually distinct constructs, and multiple-testing corrections were applied at the level of post-hoc comparisons where they are statistically most relevant.

Overall, voice condition influenced the quantity and psychological measures of participants' verbal disclosures, with praising voices eliciting more positive, affect-rich responses, while critical voices eliciting slightly more negative and the highest word count. Table 19 summarises the main effect, means, and standard deviations of all ten disclosure dimensions.

Table 19 Results for the Main Effects and Means for each Disclosure Variable

Disclosure Dimensions	***Main Effects***		***Means (SD)***			
	***F*(3,657)**	***p***	***Praising***	***Condescending***	***Encouraging***	***Critical***
Word Count	11.12	< .001	32.67 (24.23)	33.64 (24.43)	37.51 (24.11)	38.16 (25.16)
Analytic	1.73	.16	15.95 (22.87)	13.59 (21.35)	13.90 (19.22)	17.19 (23.97)
Authentic	2.31	.08	64.78 (34.83)	60.51 (34.54)	67.03 (33.05)	67.57 (34.08)
Tone	34.31	< .001	95.92 (12.45)	87.47 (26.65)	83.55 (27.88)	73.69 (32.58)
Affect	62.12	< .001	16.57 (9.97)	15.30 (9.74)	9.89 (6.77)	8.44 (6.51)
Linguistic	2.35	.07	85.36 (7.64)	84.23 (7.72)	84.01 (7.11)	83.99 (6.60)
Tone Positive	67.34	< .001	16.28 (10.00)	14.23 (9.84)	9.48 (6.91)	7.31 (6.05)
Tone Negative	7.93	< .001	.23 (1.06)	.95 (2.77)	.39 (1.40)	.83 (1.67)
Emotion Positive	64.91	< .001	5.41 (4.77)	4.72 (4.66)	1.98 (3.01)	1.59 (2.40)
Emotion Negative	6.89	< .001	.15 (.94)	.63 (2.43)	.08 (.48)	.32 (1.03)

Out of the ten LIWC measures that were analysed, seven were significant (*Word Count*, *Tone*, *Affect*, *Tone Positive*, *Tone Negative*, *Emotion Positive*, *and Emotion Negative*), suggesting that participants' psychological disclosure measurement through language use differs across all four voice conditions. Overall, the LIWC results showed that praising voices encouraged a more positive tone and emotion in participants' disclosures, while condescending and critical voices were linked to longer responses and greater use of negative tone and emotion words.

Discussion

This study aimed to determine the effects of vocal tone, particularly praising, encouraging, condescending, and critical tones, on listeners' perceived relatedness, affective responses, and psychological features of their verbal disclosures. The results aligned with our hypothesis, indicating that positively valenced vocal tones enhanced feelings of relatedness and positive affect, while diminishing negative affect. In contrast, critical and condescending tones generally produced the opposite effect. Notably, individual differences in self-esteem introduced further nuances: higher self-esteem amplified positive responses to praising tones and buffered negative affect in critical contexts. These effects underscore the profound role of prosody in shaping how spoken messages are heard and *felt* but also point to the role that individual predispositions might play in perceiving vocal expressions (c.f. Hanel & Paulmann, 2025).

Praising Tone of Voice Contributed to Greater Wellbeing and Disclosure than Encouraging, Condescending, and Critical Voice

Our findings align with decades of research demonstrating that vocal prosody plays a pivotal role in human interactions, conveying emotional states, motivational intentions, and interpersonal attitudes (Jiang & Pell, 2014; Paulmann & Weinstein, 2022; Scherer, 1986). Here, we focused on conveying interpersonal attitudes that have previously not been studied in the vocal domain. Specifically, we focused on voices that can be argued to signal an "evaluation" of the listener. This aligns with the emotional contagion framework (Hatfield et al., 2018), where listeners mirror the speaker's emotions, creating an emotional exchange. Moreover, the current results extend this understanding by showing that praising prosody doesn't just influence affect; it also boosts perceived relatedness, suggesting that positive vocal cues foster a sense of connection and strengthen interpersonal bonds (Ryan & Deci, 2020). These findings are evidence of the importance of considering vocal tone in understanding social interactions and relationship dynamics.

Interestingly, encouraging tones did not reflect the effects of praising to the same degree. While encouraging sounding voices enhanced perceived relatedness compared to negative voices, they did not significantly boost positive affect or disclosure positivity to the same extent. This may reflect subtle differences in acoustic profiles and perceived intent behind praising versus encouraging speech. Research shows that listeners are sensitive to prosodic nuances and can distinguish meanings from intended speech (Mauchand et al., 2021; Nygaard et al., 2009). The encouraging tone, which is categorised within positive emotions (see Kamiloglu et al., 2020), may be perceived as

more instrumental or goal-oriented, thus having a weaker impact on relational and affective processes compared to the pure positive regard conveyed through praise.

The condescending tone prompted more linguistic and tone disclosure with slightly higher positive tone and emotion words, compared to a critical voice or even an encouraging tone of voice. One possible interpretation is that condescending voices create an implicit challenge, igniting a defensive reaction. Participants could be attempting to reclaim their self-worth through enhanced self-expression and the utilisation of positive language, possibly to counteract the perceived belittlement in the vocal delivery (Grinstein & Kronrod, 2016) of a condescending tone of voice. Prosodic irony or sarcasm might also be at play here; condescending voices often contain a blend of negative and insincere positive cues (Rockwell, 2000; Taylor, 2015), which could elicit defensive or performative responses. This shows that negative prosody is not always averse. Sometimes, it pulls listeners into an increased negative tone and negative emotional disclosure, as depicted in our results.

Unsurprisingly, the critical voice elicited the most consistent negative responses, diminishing feelings of relatedness and eliciting a stronger negative affect. These responses correspond to the broader literature on aversive communication styles, in which expressions of criticism and contempt have consistently been linked to relational strain and emotional distress (Mauchand et al., 2020). We also found that critical voices also resulted in participants disclosing with higher negative emotions and negative tones compared to when listening to a praising or encouraging tone. This is supported by studies in criticism showing that negative feedback may elicit unpleasant emotions (Fong

et al., 2016). The fact that critical tones reduce both relatedness and positive affect demonstrates their detrimental effects on social connections and emotional wellbeing.

Self-Esteem

The role of self-esteem further highlights listeners' processing of prosodic cues. Individuals with higher self-esteem reported greater relatedness and positive affect when hearing praised voices, and were less negatively affected by critical voices. This resonates with research indicating that self-esteem functions as a psychological buffer that moderates the impact of external feedback (Jelić, 2022; Meyer, 1992; van Schie et al., 2018). Those with higher self-esteem enter interactions with more confidence and a stronger sense of self-worth, which enables them to more effectively internalise positive feedback and dismiss criticism. In contrast, individuals with lower self-esteem may be more vulnerable to negative prosody, interpreting critical tones as a further validation of their self-doubts. It is a reminder that tone of voice is not a one-way street; listeners filter it through their own psychological frameworks.

Self-Disclosure

Additionally, the disclosure analysis added another layer by showing how tone of voice shapes not only how listeners feel but also *how they speak back*. Praising voices elicited a more positive tone and emotional language, suggesting that warmth in speech begets warmth. On the contrary, critical voices prompted more negative emotional words, indicating that aversive tones perpetuate cycles of negative emotional expressions. This supports the idea that prosody does not just regulate interpersonal feelings but actively shapes linguistic behaviour (Roche et al., 2015; Spinelli et al., 2019) during disclosure. These findings suggest a dynamic interplay: vocal cues serve as catalysts that shape

emotional expression, where the affective context and vocal delivery influence one another.

Collectively, these findings have important implications for real-world contexts, especially in the workplace, where continuous feedback is regularly provided to employees (Rivera et al., 2021). The current study demonstrates how a praising voice elicits closeness to the speaker, more positive affect, and higher affective words, and more positive tone and positive emotion when disclosing, while a critical voice contributes to the opposite effects and causes more negative tone and negative emotion disclosure with the highest word count, with a similar effect demonstrated with condescending voices. Other real-life implications include the healthcare industry, as the data suggest that subtle shifts in the tone of voice could enhance listeners' disclosure and closeness to the speaker.

Conclusion

Taken together, our research confirms that tone of voice is more than just how we say things; it fundamentally affects listeners' affective states, feelings of closeness, and disclosures as a reaction to the tones of voice. Specifically, employing praising vocal tones correlates with heightened perceptions of relatedness and the elicitation of positive emotional states, whereas in contrast, the utilisation of critical vocal tones is associated with diminished relatedness and an increase in the experience of negative emotions. While encouraging and condescending tones provided mixed disclosure findings, an encouraging tone of voice enhanced relatedness, while a condescending tone resulted in increased negative affect. These insights highlight that prosody is a pivotal tool in shaping

how listeners perceive feedback, their affective state, and how they react to different voice patterns.

4.2: Does a GP’s interested-sounding tone of voice influence patients’ disclosure?

Introduction

In recent years, an expanding body of research has examined healthcare providers’ impact on patients, particularly in how physicians communicate with patients through non-verbal communication (Ambady et al., 2002; Chen et al., 2025; Robinson, 2006; Roter et al., 2006; Street et al., 2007), with tone of voice emerging as a particularly salient and understudied cue in shaping patient experience. Indeed, communication between general practitioners and patients seems to play a huge role in effective healthcare delivery, influencing patients' psychological wellbeing and their willingness to seek help (e.g,, for mental health concerns; Haskard et al., 2007; Henry et al., 2012; Ismail et al., 2020). Excellent communication, for instance, clear instructions, is crucial for patients to make informed decisions and is considered a key component of high-quality care (Sharkiya, 2023). Moreover, patient-centred care, which encompasses compassion, empathy, and responsiveness to an individual's needs, has been demonstrated to improve health status, encourage adherence to treatment recommendations, lessen symptom burden, and reduce the chances of misdiagnosis (Kwame & Petrucka, 2021; Moser et al., 2022). As part of this patient-centred care, it has been argued that non-verbal cues used by physicians, such as facial expressions, eye contact, gestures, and tone of voice, could play a key role in shaping patients' perceptions, trust, and satisfaction with healthcare encounters (Marcinowicz et al., 2010). Among these, tone of voice may

be especially critical in conveying empathy and relational intent, particularly in settings where visual cues are limited or absent.

It has been noted that effective patient-provider communication is a core clinical function for health care providers, and it is central to the delivery of quality health care services (Nichols et al., 2021). The way we speak, particularly voice and speech melody variations, are a critical element of non-verbal communication, and could play a significant role in how patients perceive their healthcare providers and the overall healthcare experience (Liu et al., 2022). For instance, a study on therapists using between a conversational voice or a recommended voice for verbal instructions during relaxation process found that participants in the recommended voice group rated the therapist's voice as "more facilitating" of relaxation than in the conversational group (Knowlton & Larkin, 2006) demonstrating that specific therapist vocal characteristics, including tone, volume, and rate, can significantly impact physiological and subjective outcomes. Furthermore, the urgency of isolating tone of voice impacts is particularly evident in contexts where other nonverbal cues, such as facial expressions or body language, are absent, for example, over-the-phone consultations. In such a social interaction, the patient's perception of the GP's interest, responsiveness, and empathy relies almost entirely on vocal characteristics. Research in psychotherapy, for example, confirms that the clinical interaction is carried out not only by what is said (Liu et al., 2022; Zolnierek et al., 2008), but also by *how it is said*, recognising the voice as a primary carrier of meaning and information. However, despite the theoretical recognition that non-verbal communication between healthcare providers and patients is critical, empirical investigations that explore the influence of non-verbal cues on patients' wellbeing and

perception are still rare. Specifically, there is little work on a key non-verbal element present in most interactions, namely, the healthcare practitioner's tone of voice. What role, if any, can showing an interest through voice cues play in patients' perceptions?

Crucially the quality of communication between physicians and patients is a fundamental determinant of patient outcomes and satisfaction (Hoopes et al., 2017). The nuances of this interaction, particularly the general practitioner's tone of voice, are critical in influencing patient psychological measures, disclosure, perceived responsiveness, satisfaction, perceived stigmatisation, and willingness to engage with mental health services. Effective communication enables shared decision-making, empowering patients to actively participate in their healthcare journey. There is some evidence that patients value clinicians' communication skills as highly as their technical abilities in determining the quality of medical care they receive (Walton, 1976). In the context of mental health, effective GP-patient communication is particularly critical due to the sensitive nature of the subject matter. Mental health conditions often carry stigma (Cornuțiu, 2013; Corrigan & Watson, 2002; Subu et al., 2021), leading to reluctance in seeking help and open communication. There is a consensus about what constitutes "best practice" for physician communication in medical encounters: fostering the relationship, gathering information, providing information, making decisions, responding to emotions, and enabling disease- and treatment-related behaviour (King & Hoppe, 2013).

Within the strategy of effective communication, the way clinicians frame their questions and respond to patients' disclosures can greatly affect therapeutic relationships (Savander et al., 2024). This study picks up this observation and further investigates into how different tones of voice, namely interested, uninterested, and neutral sounding

voices, can affect these key patient-related variables. This will allow fostering a better understanding of the subtle, yet powerful, impact of vocal cues in the primary care setting. Patient-centred care has been demonstrated to improve health status, encourage adherence to treatment recommendations, lessen symptom burden, and reduce the chances of misdiagnosis and unnecessary testing (Danaher et al., 2023). While much of the existing research on patient-centred communication has focused on primary care settings (Cornwell & Goodrich, 2011; Greene et al., 2012; Nichols et al., 2021; Shields et al., 2009), its importance in all medical encounters, including with general practitioners, is undeniable for fostering trust and facilitating effective care. Therefore, investigating these dynamics through the manipulation of tone of voice sounding interested and uninterested, can provide insights into improving communication strategies, enhancing patient experiences, and ultimately, promoting better mental health outcomes.

Present research

Given the wealth of studies on the importance of healthcare providers and patients' interactions, as demonstrated above, focusing particularly on the tone of voice of the physician is warranted. The specific qualities of a physician's tone of voice are a crucial yet underexplored dimension of nonverbal communication that can profoundly influence patient perceptions and behaviours. As a speech-related nonverbal behaviour (Mast, 2007; Silverman & Kinnersley, 2010), tone of voice carries motivational intentions to the listeners (Weinstein et al., 2018). The use of interested and uninterested tones of voice in communication holds significant implications for how messages are received and interpreted, for instance, a supportive and empathetic tone can foster trust (Honavar, 2018).

4.2: Does a GP's interested-sounding tone of voice influence patients' disclosure?

An interested-sounding tone of voice is chosen, given the established literature in healthcare indicating how showing an interest in the patient contributes to creating positive affect (Levinson et al., 2008) and reduced psychological distance between physicians and patients (Ruben et al., 2016). Furthermore, the exploration of tone of voice, as explored from the standpoint of self-determination theory, is relevant to motivational exchanges (Paulmann & Weinstein, 2022). Perceived stigmatisation of mental health assesses the patient's beliefs about societal attitudes towards mental illness and their potential impact on their help-seeking behaviour. Lastly, willingness to engage with mental health services serves as a behavioural measure, indicating the patient's readiness to seek professional support for their mental health needs. By examining the effects of GPs' tone of voice on these outcomes, this study aims to provide valuable insights into how healthcare professionals can optimise their communication styles to foster patient engagement, reduce stigma, and improve mental health outcomes.

In addition to exploring how tone of voice usage can impact psychological states and behavioural outcomes, this study will also test how voice can influence perceived responsiveness, instrumental support, satisfaction with mental health engagement, and stigma given their importance in shaping patients' experiences in healthcare settings. For example, perceived responsiveness captures the extent to which patients feel understood, supported, and valued by their GP, which has been argued to be crucial for fostering intrinsic motivation and engagement in healthcare (Roter, 2006). Similarly, perceived instrumental support (Schultz et al., 2022) reflects the tangible assistance and resources patients believe are available to them, influencing their ability to manage their health conditions effectively. The degree of satisfaction patients experience when

discussing mental health with their GP can serve as an indicator of the quality of the physician-patient relationship (Shirley & Sanders, 2013) and the likelihood of future engagement.

Psychological measures, such as the Linguistic Inquiry and Word Count (LIWC) software, offer valuable tools for analysing language patterns and gaining insights into emotional states and cognitive processes (Boyd & Pennebaker, 2015; Chung & Pennebaker, 2018; McDonnell et al., 2020; Park & Conway, 2017). The dimensions of language used in LIWC, such as Word Count, Linguistic Style, Affective Words, and Tone of Disclosure (Tausczik & Pennebaker, 2009), provide indicators of how individuals process and express their thoughts and feelings. These tools can provide a more sophisticated and subtle understanding of the psychological process behind disclosed information. Disclosure, by its definition, is the act of revealing personal information, which is crucial in mental healthcare, as it allows patients to share their experiences, concerns, and emotions with healthcare providers.

In short, this study will explore the influence of GP's tone of voice on listeners' behavioural outcomes. We hypothesise that a general practitioner's tone of voice will significantly impact patients' disclosure, perceived responsiveness, satisfaction in engaging with their GP about mental health, perceived stigmatisation of mental health, and willingness to engage with mental health services. To investigate the opposing hypothesised effect, uninterested-sounding and neutral-sounding are added as different voice conditions. While showing an interest in patients is deemed important in support and recovery (Ruben et al., 2017), showing an interest just through the tone of voice has yet to be investigated.

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Hypotheses

We predict:

H1: Listening to GPs' interested-sounding voices increases patients' self-disclosure compared to listening to uninterested and neutral-sounding voices.

H2: Listening to GPs' interested sounding voices increases patients' perceived responsiveness of the GP compared to listening to uninterested and neutral sounding voices.

H3: Listening to GPs' interested voices increases people's anticipation of more satisfaction in engaging with their GP about mental health compared to uninterested and neutral voices.

H4: Listening to GPs' interested voices leads to less perceived stigmatisation of mental health compared to uninterested and neutral voices.

H5: Listening to GPs' interested voices contributes to people being more willing to engage with mental health services compared to uninterested and neutral voices.

Methods

Ethical approval was provided by the Ethics Subcommittee-3 of the University of Essex (ETH2324-0329).

Stimuli development

Speakers were recruited from the School of Health and Social Care of the University of Essex through a staff mailing list. Six academics working for the school responded to the advertisement. They were all briefed about the goal of the study before the recordings. Recordings took place in person at one of the audio recording booths in the Department

of Psychology, except for two speakers who recorded their voices on their laptops at their homes. Recordings were saved as .wav files from Audacity projects. All recordings used a high-quality microphone provided by the researcher and maintained the same distance from the microphone to the speaker.

Prior to the commencement of the recording, speakers were instructed to imagine that they were interacting with a patient and asking them a series of questions in three different tones of voice (interested, uninterested, neutral-sounding). First, the recording started with their natural speaking voice, aiming not to convey any emotional intention (from now on referred to as neutral-sounding voice). They were instructed to speak in their normal, everyday voice and to speak calmly and clearly, without overdoing or modulating their voices. Then, they were asked to speak in an interested-sounding voice, meaning that the speakers were asked to show an interest in the patient's wellbeing, including the intention to signal being curious, caring, ready to help, and approachable through their voice. Finally, for the uninterested-sounding voice, speakers were instructed to convey indifference to the patient and not show any interest, as if they couldn't care less, without being helpful, rude or harsh. Each speaker recorded each voice condition a few times, until the lead researcher and the speaker were satisfied with the materials. No examples of how to sound were given to speakers.

Before the validation, six speakers (35-57 years old) recorded their voices. After the validation, three speakers with the highest mean scores in each voice condition were selected for the study. Although we had a male speaker in our initial number of speakers, after the validation, the materials that showed better ratings were all from the female speakers.

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The questions asked by the speakers were adapted from a combination of the 21-item Depression Anxiety Stress Scales (Lovibond & Lovibond, 1995) and the NHS Self-Assessment Tool (2025). The final six questions in the study were modified to ensure that participants would provide more than a "yes" or "no" answer to the questions, given that one of the outcome measures for the study is to measure patients' disclosure. The questions asked by the speakers in three different sounding voices were:

a. Describe a time, as recently as possible, when you found it hard to wind down or relax. Describe how you felt and what made it difficult in particular.
b. What are some things that give you meaning and purpose in life?
c. Can you describe the last time when you felt little pleasure in doing something that you usually find enjoyable or meaningful?
d. Can you tell me about a recent time you felt nervous, anxious, on edge or scared? What was it that made you feel this way? How did you feel at that moment compared to after some time had passed?
e. Can you tell me about a time when you worried too much or felt scared about something happening, even if there was no obvious reason to feel that way? What do you think led you to feel this way? How did you feel after some time had passed?
f. In what situation do you find it difficult to concentrate on things?

Validation

In a validation study, materials were distributed across two surveys. The first survey presented the recordings of the interested, uninterested, and neutral voices for three speakers (2 females, 1 male), while the second survey had the recordings of the other

three speakers (3 females) in three voice conditions. Fifteen participants rated the voices used to speak materials in each survey on a scale from 1 (sounding extremely uninterested) to 7 (sounding extremely interested), with 4 being neither interested nor uninterested (neutral). Table 20 below shows the means and standard deviation scores for the validated materials of the final three selected speakers and Table 21 below shows the acoustic analysis of the three selected speakers.

Table 20 Mean Ratings and Standard Deviation for the Speakers

Speaker	***Gender, Ethnicity***	***Profession (Age)***	***Voice Conditions***		
			Interested-sounding	***Uninterested-sounding***	***Neutral-sounding***
1	Female, White British	Psychological Wellbeing Practitioner (57)	M = 6.27 SD = 1.03	M = 2.27 SD = .88	M = 4.47 SD = .83
2	Female, White British	Nurse (36)	M = 5.13 SD = .92	M = 2.93 SD = 1.49	M = 4.20 SD = 1.08
3	Female, White British	Academic/ Psychological Wellbeing Practitioner (36)	M = 4.80 SD = .78	M = 2.40 SD = .74	M = 3.73 SD = .80

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Table 21 Speakers' Acoustic Analysis

	Voice Conditions		
Acoustic Analysis	***Interested-sounding voice***	***Uninterested-sounding voice***	***Neutral-sounding voice***
Mean Fundamental Frequency (F0), Hz	212.56	192.73	196.90
Speech rate, (seconds)	4.23	4.39	4.36
Mean Long Term Average Spectrum (LTAS), dB	7.96	8.07	7.60
Cepstral Peak Prominence (CPP), dB	35.50	33.94	35.92

Participants

Using G-Power sample size calculation, 342 participants were recruited on Prolific to achieve a 95% power for a small effect size (f = .21). A between-subjects design was employed for this study. 114 participants listened to either the interested (55 males, 59 females; M_{age} =44.34; 104 whites, 2 blacks, 6 Asians, and 2 mixed race), uninterested (58 males, 56 females; M_{age} =41.53; 97 whites, 1 black, 8 Asians, 1 Middle Eastern and 7 mixed race), or neutral (56 males, 54 females, 3 non-binary; M_{age} =42.06; 101 whites, 3 blacks, 3 Asians, and 7 mixed race) voice condition for the three speakers.

Procedure

In the information sheet at the beginning of the survey, participants were informed that this study is a part of a new mental health programme with a local NHS Trust meant to

focus on preventative screening to help people build mental health, just like other preventative programmes that support physical health. Participants were instructed to imagine that they were a patient attending a routine visit with the trainee doctor and to answer the doctor's questions to the best of their ability. The instruction also included that participants were later allowed to evaluate the trainee doctor, before being given a couple of minutes after each question to provide written answers. Participants were also reminded to be in a quiet place for the study.

Then, participants completed the demographic section of the online survey and tested a recording for audio check to confirm they could hear the materials, followed by detailed instructions about the study. Participants were informed that they would first listen to questions by the trainee doctor, one at a time, and answer the question in writing before being given the chance to rate all the audio they listened to at the very end. All the recordings were included at the end for participants to replay the recordings altogether again, in case participants needed reminding of the voices they had just heard, after spending time writing in their answers to every question before that. Finally, participants were debriefed about the study.

Survey

The following scales were included in the survey and served as dependent measures.

Perceived Responsiveness. Participants responded to three items taken from the relatedness subscale of the IMI (Ryan et al., 2016) and adapted to the current context. On a scale from 1 (Strongly disagree) to 7 (Strongly agree)**,** participants were asked how much they agreed with the following statement when thinking about the doctor trainee

who just spoke to them "This doctor really cares about me"; "This doctor really understands how I feel"; and "This doctor really values my opinions and abilities". The scale had good internal consistency with α = .932.

Perceived Instrumental Support. Questions used to measure instrumental support were adapted from the Instrumental Support scale (Morelli et al., 2015). Participants rated four items on a scale from 1 (Not at all confident) to 7 (Very confident), for their level of confidence in whether the trainee doctor could assist with their mental health: "I am confident that this doctor can assist with routine mental health care"; "I am confident that this doctor can solve mental health issues"; "I am confident that this doctor can assist in a mental health emergency"; "I am confident that this doctor can assist with medication". Internal consistency was high, α = .908,

GP Satisfaction with Mental Health. Participants rated eight items on a scale from 1 (Not at all) to 7 (A great deal), which asked about their satisfaction with the GP if they were to experience a mental health issue. Participants were asked, "How satisfied do you think you would be with the ability to get an appointment with this doctor?" "How satisfied do you think you would be with the amount of time with this doctor at each visit?" "How satisfied do you think you would be with their ability to be referred to a mental health specialist?"; "Do you feel that this doctor would do their best for you?"; "Do you feel that you would be happy with your mental health treatment?"; "Do you feel that the mental health advice would you get from this doctor would be helpful?"; "Do you think that easier

access to this doctor would help you cope with your mental health better?"; and "Do you think that this doctor would fully understand your mental health needs?" (α =.949).

Stigma SSOSH-7. Participants responded to seven items on a scale of 1(Strongly disagree) to 7 (Strongly agree), asking about their stigma toward getting medical help for mental health issues. The items were taken from the Self-Stigma of Seeking Help Scale-Revised (Brenner et al., 2021). The seven items were: "I would feel inadequate if I went to a doctor for psychological help"; "My self-confidence would not be threatened if I sought professional help"; "Seeking psychological help would make me feel less intelligent"; "It would make me feel inferior to ask a doctor for help"; "I would feel okay about myself if I chose to seek professional help"; "If I went to a doctor, I would be less satisfied with myself" and "I would feel worse about myself if I could not solve my problems" (α =.906) Item two was reverse-coded.

Intention to comply. Participants responded to two items to measure participants' willingness to participate in the mental health programme: "How interested would you be in learning more about this new mental health programme?" and "Would you be willing to share your email address so that you can learn more?" on a scale from 1 (Not at all) to 7 (Very much). These were new items created for this study. Internal consistency for the items was α =.790.

4.2: Does a GP's interested-sounding tone of voice influence patients' disclosure?

Results

Patients' Wellbeing Outcomes

To examine the effect of GP's tone of voice on patients' Perceived Responsiveness, Perceived Instrumental Support, GP Satisfaction with Mental Health, Stigma, and Intention to comply, a one-way ANOVA was employed for each DV.

The main effect of tone of voice was significant for perceived responsiveness ($F(2, 339) = 16.76$, $p < .001$, $\eta^2_p = .09$). Post-hoc pairwise comparisons, adjusted using the Benjamini–Hochberg FDR procedure, indicated that all contrasts remained significant at $p < .001$. Perceived responsiveness was highest when healthcare professionals used an interested-sounding voice ($M = 4.61$, $SD = 1.23$), lower following a neutral-sounding voice ($M = 4.15$, $SD = 1.27$), and lowest following an uninterested-sounding voice ($M = 3.58$, $SD = 1.49$).

Similarly, the main effect of tone of voice was significant for patients' perceived instrumental support, $F(2, 339) = 10.74$, $p < .001$, $\eta^2_p = .06$. Post-hoc pairwise comparisons, adjusted using the Benjamini–Hochberg FDR procedure, showed that all contrasts remained significant at $p < .001$. Instrumental support was rated highest for interested voices ($M = 4.77$, $SD = 1.05$), significantly higher than both uninterested ($M = 4.01$, $SD = 1.42$) and neutral-sounding voices ($M = 4.51$, $SD = 1.28$). This pattern highlights the central role of vocal cues, suggesting that patients felt more confident in GPs who communicated with an interested-sounding tone, perceiving them as more capable of providing mental health support compared to those who used an uninterested or neutral tone of voice.

4.2: Does a GP's interested-sounding tone of voice influence patients' disclosure?

The main effect of tone of voice was also significant for GP satisfaction with mental health ($F(2, 339) = 13.25$, $p < .001$, $\eta^2_p = .07$). Post-hoc pairwise comparisons were adjusted using the Benjamini–Hochberg FDR procedure; all contrasts remained significant at $p < .001$. satisfaction was highest following interested-sounding voices ($M = 4.82$, $SD = 1.01$), lower following neutral voices ($M = 4.48$, $SD = 1.22$), and lowest following uninterested-sounding voices ($M = 3.98$, $SD = 1.45$).

Patients' stigma toward seeking mental health care was measured as a general attitude after exposure to the different tone of voice conditions. A one-way ANOVA indicated that the effect of tone of voice on patients' stigma was not statistically significant ($F(2, 339) = 2.34$, $p = .10$, $\eta^2_p = .01$). This implies that the perceived tone of voice was not associated with differences in patients' stigma in this context.

Similarly, patients' intentions to comply (i.e., willingness to participate in future mental health programs) were assessed as a general measure following the tone of voice exposure. A one-way ANOVA revealed no significant effect of tone of voice on behavioural intentions ($F(2, 339) = 1.20$, $p = .30$, $\eta^2_p = .01$), suggesting that the tones of voice were not related to patients' reported willingness to engage in future mental health programs.

Table 22 Means and Standard Deviations for the Voice Conditions across Outcomes

Outcomes measured	*F (2, 339)*	***Interested-sounding voice*** *M (SD)*	***Uninterested-sounding voice*** *M (SD)*	***Neutral-sounding voice*** *M (SD)*
Perceived Responsiveness	16.76, $p < .001$	4.61 (1.23)	3.58 (1.49)	4.15 (1.27)
Perceived Instrumental Support	10.74, $p < .001$	4.77 (1.05)	4.01 (1.42)	4.51 (1.28)
Satisfaction with GP on Mental Health	13.25, $p < .001$	4.82 (1.01)	3.98 (1.45)	4.48 (1.22)

4.2: Does a GP's interested-sounding tone of voice influence patients' disclosure?

Listeners' Self-Disclosure

To investigate participants' disclosure to the GP based on the effect of the tone of voice, one-way ANOVAs were conducted to examine whether healthcare professionals' tone of voice influenced patients' written disclosure. Thirteen disclosure dimensions measuring psychological linguistic variables, using the Linguistic Inquiry Word Count software (LIWC; Tausczik & Pennebaker, 2009) were used. The variables are *Word Count, Analytical thinking, Authentic communication, Tone of disclosure, Linguistic style, Affect communicated, Function words used, Verbs used, Pronouns used, Positive Tone, Negative Tone, Positive Emotion,* and *Negative Emotion*.

Tones of voice did not have a significant effect on any of these disclosure dimensions except for *Linguistic style* ($F(2, 339) = 3.02$, $p = .05$, $\eta^2_p = .02$) and *Function* words used ($F(2, 339) = 3.06$, $p = .048$, $\eta^2_p = .02$). Post-hoc pairwise comparisons were therefore conducted and adjusted using the Benjamini–Hochberg false discovery rate (FDR) procedure. After FDR adjustment, these pairwise differences did not reach statistical significance.

Descriptively, however, patients tended to use slightly more function words after listening to interested-sounding voices ($M = 62.31$, $SD = 3.32$) compared with uninterested-sounding voices ($M = 61.16$, $SD = 3.71$) and neutral voices ($M = 61.51$, $SD = 3.87$). Similarly, participants showed slightly higher Linguistic style scores following interested voices ($M = 78.93$, $SD = 3.60$) relative to neutral voices ($M = 77.85$, $SD = 3.50$), but not compared with uninterested voices ($M = 77.99$, $SD = 3.50$).

Overall, these findings suggest that tone of voice did not exert a robust or consistent influence on patients' written disclosure across LIWC dimensions. At most,

there were weak and descriptive tendencies for interested-sounding voices to shape certain features of language (e.g., grammatical style and use of function words) but did not meaningfully impact the overall effect on disclosure. Table 23 presents the means and standard deviations for all LIWC variables across tone conditions.

Table 23 Means and Standard Deviations for all LIWC Variables across Conditions

DV	***Voice Conditions (N = 114/condition)***				
	Interested M (SD)	***Uninterested M (SD)***	***Neutral M (SD)***	***F(2, 339)***	***p***
Word Count	266.22 (139.17)	262.97 (118.44)	252.63 (128.20)	.35	.71
Analytic	25.05 (17.47)	26.85 (16.90)	24.99 (16.72)	.44	.65
Authentic	96.67 (4.64)	96.83 (3.89)	96.48 (5.38)	.16	.86
Tone	15.38 (17.42)	19.94 (19.68)	16.21 (18.00)	1.99	.14
Linguistic	78.93 (3.60)	77.99 (3.51)	77.85 (3.50)	3.12	.05
Function	62.31 (3.32)	61.17 (3.71)	61.51 (3.86)	3.01	.05
Verb	20.00 (2.75)	19.32 (2.81)	19.45 (2.86)	1.86	.16
Pronouns	18.33 (2.55)	18.18 (3.16)	17.81 (2.90)	.97	.38
Affect	7.76 (2.42)	7.56 (2.13)	7.61 (1.87)	.28	.76
Positive Tone	3.18 (1.37)	3.39 (1.28)	3.21 (1.32)	.81	.45

4.2: Does a GP's interested-sounding tone of voice influence patients' disclosure?

Negative Tone	4.50 (1.89)	4.14 (1.76)	4.30 (1.39)	1.28	.28
Positive Emotion	1.38 (.74)	1.53 (.88)	1.42 (.89)	1.11	.33
Negative Emotion	2.99 (1.40)	2.86 (1.38)	3.14 (1.34)	1.22	.30

The use of non-corrected tests is justified because the dependent variables represent a priori test. In particular, they reflect conceptually distinct constructs, and multiple-testing corrections were applied at the level of post-hoc comparisons where they are statistically most relevant.

Discussion

The present study investigated the impact of general practitioners' tone of voice on patients' self-disclosure, perceived responsiveness, satisfaction with mental health engagement, perceived stigmatisation, and willingness to engage with mental health services. The findings revealed significant effects of tone of voice on several key variables, shedding light on the importance of non-verbal communication in healthcare settings. Our findings highlight the importance of GPs adopting an interested tone of voice to foster positive patient outcomes. Collectively, the results showed that GPs' interested tone of voice significantly improved patients' experiences, including higher perceived responsiveness, greater instrumental support, and increased satisfaction with their GP in mental health than an uninterested or neutral tone of voice.

4.2: Does a GP's interested-sounding tone of voice influence patients' disclosure?

GP's Interested Tone of Voice Effects on Patients' Perceptions

First, the effect of tone of voice on perceived responsiveness was clear and consistent with existing literature on patient-provider communication. Patients rated GPs who spoke in an interested tone as more responsive than those who sounded neutral or uninterested. This finding supports prior work showing the importance of non-verbal behaviours, particularly vocal cues, in building successful doctor-patient relationships. Patients appear to be sensitive to this type of non-verbal behaviour, as showing interest could also signal that their GP is listening to them (Marcinowicz et al., 2010). This aligns with Self-Determination Theory (Ryan & Deci, 2000), where relatedness, the feeling of connection and belonging, is a fundamental psychological need. When GPs demonstrate an interested tone of voice, patients likely feel more understood and validated, thus boosting their sense of relatedness and perceived responsiveness.

Similarly, the significant impact of tone of voice on perceived instrumental support highlights the role of non-verbal cues in shaping patients' confidence on GPs' capabilities to assist and solve in mental health care, including mental health emergency. Within the current healthcare context, instrumental support refers to the tangible assistance and resources that individuals receive from others (Morelli et al., 2015; Schultz et al., 2022). A GP who aims to sound interested is more likely to be perceived as someone who is willing to provide the necessary support and guidance for mental health needs, which could in turn enhance patients' sense of empowerment and self-efficacy in managing their mental health (Zolnierek et al., 2008).

Patients believed that GPs speaking with an interested tone would be more able and willing to provide help for their mental health concerns. These findings support

research showing that relational cues shape expectations about professional competence and supportiveness (Mulvaney-Day et al., 2011; Parker et al., 2020; Sturman et al., 2022). Such expectations may have real consequences: when patients sense greater support, it is possible that they may be more likely to return for follow-up care or trust the treatment recommendations provided. Moreover, the findings on GP satisfaction with mental health engagement demonstrate the importance of fostering a positive and collaborative therapeutic environment.

Moreover, satisfaction with mental health care was also increased when the GP's tone was interested, as opposed to sounding uninterested or neutral. This implies that tone of voice contributes not only to the perceived relational quality of the interaction but also to patients' broader satisfaction with their care experience. Studies have shown that satisfaction with the GPs increased when communication, including non-verbal cues, such as tone of voice, is employed effectively (Artati et al., 2018; Mast, 2007; Parker et al., 2020), including looking at the patient before looking at the computer (Silverman & Kinnersley, 2010) and showing genuine care through non-verbal cues such as body language (Chen et al., 2025; Otani et al., 2009; Tallman et al., 2007). Our study directly shows that the importance of just modulating the tone of voice to show interest could significantly impact how satisfied patients are with the GP, compared to GPs showing disinterest or even when using their neutral tones of voice. It may take a bit of effort to have the intention and then speak with an interested-sounding voice, compared to a neutral everyday voice, but if this contributes to greater satisfaction from the patients, it's an effort worth putting in daily practice.

In contrast, tone of voice did not significantly affect patients' reported stigma toward seeking mental health support. This suggests that stigma, as a more deeply held attitude shaped by broader societal beliefs, may not be easily shifted through a single exposure to a GP's vocal style. Previous work has shown that stigma reduction often requires sustained intervention involving education, contact with individuals with mental illness, and changes to structural policies (Henderson & Gronholm, 2018; Kaiser et al., 2022; Letteney & Laporte, 2004). It is possible that the brief tone manipulation in this study was not sufficient to overcome pre-existing stigmatising beliefs. Therefore, while vocal tone can strengthen perceptions of support and satisfaction, its effect on entrenched attitudes such as stigma may be limited.

Interestingly, while relational outcomes can be shaped by short tone of voice exposure, patients' willingness to engage with mental health services did not differ across voice conditions. The finding that tone of voice did not significantly influence patients' willingness to engage in future mental health programs highlights a possible disconnect between immediate perceptions and longer-term behavioural intentions. Moreover, this could also be explained by the intention-behaviour gap described in health psychology literature, where individuals' attitudes and intentions do not always translate into actual behaviour (Conner & Norman, 2022; Feil et al., 2023; Sheeran, 2002). One implication is that while vocal tone can improve the immediate interaction, it may need to be combined with other forms of support or intervention to change actual help-seeking behaviours.

GP's Interested Tone of Voice on Patients' Self-Disclosure

Finally, the analysis of linguistic style and function words within patients' disclosures revealed that listening to interesting-sounding voices led to patients

employing a linguistic style and grammar structure disclosure. Interestingly, no other variables, such as the number of words spoken, affective thoughts revealed, or emotional tone employed in the disclosure were impacted by the way a GP spoke. This suggests that voice can influence the linguistic style and function words used in listeners' responses (Pennebaker et al., 2014), but the vocal communication did not meaningfully affect what they chose to share or how emotionally open they were (Castiglioni et al., 2023). Studies examining disclosure in healthcare settings (Farber & Hall, 2002; Greene et al., 2012; Liu et al., 2022; Zolnierek et al., 2008) have found that the depth and substance of patient disclosures are more strongly associated with factors such as pre-existing trust in the healthcare provider, the perceived empathy of the provider, and the overall quality of the therapeutic relationship, which requires time to build and may not directly impact in a one-instance period of listening to a GP asking a series of questions. Combining all these factors, such as building trust to encourage disclosure over time, in addition to ensuring the GPs' tone of voice shows an interest in patients' wellbeing, could be a more wholesome approach for future research.

Overall, these results show that when healthcare providers speak with an interested tone, patients feel more understood, supported, and satisfied, which strengthens the patient-doctor relationship. An uninterested tone has the opposite effect. However, tone of voice doesn't always change deeply held beliefs, such as stigma, or influence patients' intentions to follow medical advice. This means that while tone of voice is a powerful tool for improving how patients experience care, it should not be viewed as a substitute for broader interventions aimed at reducing stigma or motivating behaviour

change, but rather as a complementary tool that enriches the therapeutic, treatment, and care-provider environment.

Importantly, these findings contribute to the growing body of evidence (Duggan & Parrott, 2001; Finset, 2007; Ruben et al., 2017) indicating that subtle non-verbal communication cues, particularly the tone of voice of the GP, play a major role in significantly influencing patient-provider interactions, shaping closeness, perceived competence for treatment and satisfaction with the GP if patients were to experience mental health issues. Showing interest in the patient is more than just showing care, being ready to help or being approachable using the tone of the voice, but it also builds positive perceptions, such as confidence, closeness toward the GP. Thus, tone of voice is more than just a tool for GPs to use to better communicate with their patients; it is an integral factor that may make or break the treatment.

For practitioners, the current study could be a stepping stone to propose vocal training or heightened awareness of how tone is perceived could be a practical and cost-effective strategy to improve the patient experience and cultivate stronger therapeutic alliances. Given the importance of provider-patient relationship in the healthcare settings (Lang, 2012; Parry et al., 2014; Soma et al., 2023) and the wealth of studies on effective communication to the patients, including non-verbal communication such as the tone of voice (Ahmed et al., 2022; Mast, 2007; Zolnierek et al., 2008), starting small by simply modulating the tone of voice could be an important approach to improving care. Moreover, the study reinforces the need for nuanced communication training for healthcare providers, emphasising the importance of vocal tone alongside other elements of effective communication to foster a more patient-centred approach.

4.2: Does a GP's interested-sounding tone of voice influence patients' disclosure?

Conclusion

This study demonstrates that tone of voice is far from trivial. It highlights measurable effects on how patients perceive their GPs' responsiveness, support, and competence, ultimately affecting their engagement and satisfaction with mental health care. Integrating these insights into clinical practice and future research endeavours could pave the way for more effective and empathetic healthcare interactions.

4.3: An Exploratory Analysis of Teachers' Tone of Voice and Pupils’ Disclosure

Introduction

Teachers play a central role in shaping classroom dynamics and influencing students' learning experiences (Zhang & Zhang, 2020). Effective communication between teachers and students is crucial for fostering a positive and productive learning environment (Rabo, 2022). Particularly, research has shown that students' classroom experiences and learning outcomes are directly influenced just through the tone of teachers' voices. For instance, teachers’ vocal quality, including their instructional tone and manner, has an impact on how engaged their students are in the learning process, which in turn helps students achieve academic success (Calinao et al., 2023). Similarly, research on teachers’ tones of voice, namely autonomy-supportive voices have been shown to increase students’ relatedness and autonomy, while controlling tones of voice resulted in students' psychological needs being less satisfied and their general wellbeing being worse (Paulmann & Weinstein, 2022).

Moreover, a review of the literature on students’ perception toward teachers’ tone of voice in classroom interaction found that: 1) tone of voice, can express a range of emotions, including friendliness, anger, and anxiety, which then impact students’ engagement and learning outcomes; and 2) effective use of tone of voice can create a

positive learning atmosphere and engage students (Nurchintyawati, 2023). The review demonstrated the significant aspect of non-verbal communication that directly impacts student perceptions and engagement, merely through the tone of voice. Teachers' non-verbal behaviours and social signals are crucial in shaping classroom interactions and conveying intentions (Kesevan et al., 2020). While non-verbal communication in the classroom has been studied, the specific impact of vocal tone on student disclosure remains relatively unexplored (Caswell & Neill, 2003).

From this, it is evident that a major component of nonverbal communication that influences students' perceptions and academic performance is the tone of the teacher's voice. Giving a special focus on the tones of the teacher may not always come intuitively when teaching, but pre-service teachers who frequently alter their speech patterns, employing slower speech rates, longer speech turns, and more pauses, have shown to improve student learning experience, although it could also cause vocal strain (Järvinen et al., 2024).

Moreover, research has shown the impact of a teachers' voice on students' listening conditions in learning spaces. Fifty participants listened to narratives presented by a virtual female professor, who spoke in either a typical or hoarse voice while participants performed a secondary task. Results revealed significantly prolonged secondary-task response times with the hoarse voice compared to the typical voice, indicating increased listening effort. Participants also rated the hoarse voice as more annoying, effortful to listen to, and impeding for their cognitive performance (Schiller et al., 2024).

Benefits of Self-Disclosure

The act of disclosing information, or self-disclosure, has been conceptualised to affect psychological wellbeing by enhancing perceived connectedness, receiving social support, and expressing authenticity by being honest and staying true to oneself (Harvey & Boynton, 2021; Luo & Hancock, 2020). Studies on students' disclosing or being able to open up and share with teachers or education providers can provide educators with the opportunity to connect with students and understand the various issues that affect students' personal and academic growth. For example, written and verbal disclosure of personal experiences promote an attentional process that focuses on the topic of disclosure (Cox, 2025), an essential social tool utilised in communication to cultivate relationships and enrich the discussion (Davidson, 2019; Mutia & Ridha, 2019; Ravichander & Black, 2018). The capacity to self-disclose is an essential interpersonal process that helps in achieving important developmental milestones throughout adolescence. Specifically, changes in self-disclosure behaviours may reflect a dependence on peers for emotional support (Vijayakumar & Pfeifer, 2020). Thus, investigating the non-verbal effects of teachers', particularly, the tone of voice showing motivational intention through autonomy-support and how it elicit disclosures from pupils is crucial to explore.

Collectively, these studies all point to one main theme: the importance of teacher's toolkit, the *tone of voice* within the classroom in shaping students' experiences. To expand on this existing body of knowledge on the vital role of teachers' tone of voice, we aim to provide insights into how specific acoustic features of teachers' voices relate to the

degree to which students are willing to open up and share their thoughts and feelings or commonly known as self-disclosure. For instance, a calm, gentle, and steady tone can signal empathy and openness, reduce anxiety and encourage disclosure, while harsh or rushed tones might make students feel judged or dismissed.

Present research

In the present study, we examine whether subtle acoustic features of teachers' voices shape the way students disclose and express themselves during classroom interactions. Prior research suggests that prosodic cues such as pitch and measures of vocal clarity, including cepstral peak prominence, are linked to perceptions of warmth, support, and engagement (e.g., Chapman, 2007; Ding et al., 2022). Drawing on this, we predict that higher pitch and greater vocal clarity may be associated with students producing more elaborated and authentic responses, as reflected in linguistic markers such as word count, authenticity, and tone. While these associations are expected to be modest, identifying the links between teachers' acoustic and pupils' disclosure would provide initial evidence that certain vocal characteristics may subtly influence disclosure in teacher-student interactions.

Paulmann and colleagues (Paulmann et al., 2018) examined 107 video tapes of parent-child interactions for motivational tone of voice in which the tone of voice could stimulate children to perform an action and/or praised the children for an action they had performed revealed that autonomy-supportive motivation was better predicted if prosody was confined to single words as opposed to longer phrases or sentences, and overall, controlling utterances were spoken with a louder and faster voice than autonomy-

supportive materials. Further on, the authors mentioned that laboratory-based tasks can sometimes elicit more stereotypical or exaggerated expressions of prosody than would naturally occur in everyday teacher–student interactions, as argued in Weinstein et al. (2018). Drawing on this, in the present study, the materials were drawn from a teacher-student interaction that was not specifically designed to examine prosodic patterns. Nevertheless, both teachers and students were aware that their interactions were being recorded, which may have led teachers to moderate their tone of voice potentially an autonomy-supportive tone of voice.

The current study on teacher's acoustic analysis and pupils' disclosure is crucial as the results could inform teacher training and professional development programs, emphasising the importance of vocal delivery in creating a more supportive and communicative classroom atmosphere.

Hypothesis

We aimed to investigate two key questions in the context of teacher–student interaction:
H1: To what extent does the teacher's tone of voice reflect autonomy-supportive characteristics, as defined by lower mean pitch, softer vocal intensity, slower speech rate, and reduced vocal variability (Paulmann & Weinstein, 2017)?
H2: Do teachers' tone of voice patterns predict greater pupil disclosure across sessions?

Methods

Ethical approval was provided by the Ethics Subcommittee-3 of the University of Essex (ETH2324-1451).

Data

This study utilised secondary audio data from one-on-one mentoring sessions between academic mentors and high school pupils. As the researchers did not collect the recordings, factors such as speaker distance from the recorder and background noise (e.g., paper shuffling, fan noise) were beyond our control. For all data, only recordings where the content was intelligible were used for data analysis.

Procedure

Audio recordings from one-on-one coaching conversation were provided by an external ed-tech provider. All recordings were converted to .wav format to preserve the acoustic characteristics (i.e., not cut or reduced if using other formats such as mp3). For each conversation, the content of each recording was first transcribed and then segmented by speaker turns. These segmented intervals served as the basis for acoustic extraction, with parameters later aggregated to the session level for statistical analyses. Acoustic features of the teachers' voices were then extracted using PRAAT (Boersma, 2001). In very few instances, one part of speech was inaudible (might be due to recording fault), which resulted in a small part of the speech becoming inaudible. If segments were missing due to this, analysis of the whole speech was conducted based on the available data.

The original sessions were categorised into discussing different topics such as academic goal setting, study strategies, and open-ended "say anything" discussions. As part of the approach from the ed-tech provider, teachers are encouraged to employ autonomy-supportive learning strategies, encouraging pupils to reflect, express themselves, and develop self-directed learning plans.

Participants

The dataset included 30 recordings involving two mentors: one male and one female. Twenty-seven sessions were led by the male tutor. One additional recording featured an additional male teacher. Although the dataset comprised 30 recorded mentoring sessions (the unit of analysis), each session was segmented into multiple spoken intervals (e.g., teacher question followed by pupil response), resulting in approximately 1,278 dialogue intervals across all sessions. Acoustic features were extracted at the interval level to maximise measurement precision, but were subsequently aggregated at the session level to preserve statistical independence. All inferential analyses, therefore, reflect session-level (N = 30) estimates informed by multiple within-session observations. A sensitivity power analysis for the regression model was conducted in G*Power ($\alpha = .05$). With the final analytic sample of 30 mentoring sessions and five predictors, the study had 80% power to detect effects of $f^2 = .54$, corresponding to a large effect size. Although this indicates limited sensitivity to smaller effects, the analysis was based on a rare, naturalistic dataset in which each unit of analysis represented a full mentoring session rather than an individual participant.

Acoustic Extraction

To examine teachers' tone of voice, four acoustic commonly used parameters are chosen: fundamental frequency (or pitch), speech rate, cepstral peak prominence, and long-term average spectrum (Banse & Scherer, 1996). Pitch, one of the most examined acoustic parameters in voice studies (see Jin & Park, 2023), reflects the perceived highness or lowness of a voice, which, in the context of communication, conveys emotions and attitudes (Banse & Scherer, 1996; Paulmann et al., 2008). Speech rate is

calculated by dividing the duration of the speech by the number of syllables and/or words. Cepstral peak prominence measures voice clarity and sharpness, reflecting the stability and distinctness of vocal production. Lastly, long-term average spectrum represents the overall distribution of energy across different frequencies in the voice signal, with lower values suggesting a softer tone of voice (Vrijders et al., 2024). These four parameters are chosen to provide an overall, comprehensive understanding of teachers' vocal characteristics and how they might impact pupils' disclosure.

Four parameters were analysed: mean fundamental frequency (Hz), mean speech rate, cepstral peak prominence (CPP), and LTAS (0–2000 Hz and 5000-8000 Hz). Pitch was extracted using a floor-ceiling range of 100–300 Hz for female voices and 75–250 Hz for male voices. CPP was calculated with a quefrency floor of 0.05 and a maximum frequency of 5000 Hz. LTAS values were based on average energy in the 0–2000 Hz and frequency band. All measures were calculated across the full segment duration.

After extracting the various acoustic parameters in PRAAT, data for all 30 sessions were combined in alphabetical order and arranged in an Excel file. For ease of statistical analysis, the acoustic analysis of the teachers was grouped according to utterances (or per dialogue) and pupil's disclosure, meaning that for each question, the student responding to that particular question is one utterance (or dialogue), and the next question by the teacher and the pupil's answer (or answers) is another utterance. This was done for all 30 recorded sessions that ranged from 3.40 minutes to 18.19 minutes per session.

Self-Disclosure

To assess students' levels of disclosure, a rigorously-built psychological disclosure software, the Linguistic Inquiry Word Count (LIWC; Boyd & Pennebaker, 2015;

Pennebaker et al., 2015) is used to quantify pupil's responses, focusing on their Word Count, their logical and analytical Thinking (*Analytic*), authentic and honesty in their responses (*Authentic*), the tone of their disclosure (*Tone*), the emotional words used (*Affect*), linguistic style of their responses (*Linguistic*), prosocial languages used (*Prosocial*), and to have a deeper focus on the tone and emotion of their languages by examining the *Positive Tone*, *Negative Tone*, *Positive Emotion*, and *Negative Emotion*.

Results

Teachers' Acoustic Analysis

The results of the acoustic analysis showing speech rate, fundamental frequency (pitch), cepstral peak prominence (CPP) and long-term average spectrum (LTAS) extracted in PRAAT and aggregated according to sessions are presented in Table 24 for each session.

Table 24 Acoustic Analysis of Teachers' Voice for 30 Sessions

Session	Fundamental Frequency (*Mean F0, Hz*)	Speech Rate (*wps*)	CPP (*dB*)	LTAS 0-2000 (*dB*)	LTAS 5000-8000 (*dB*)	Intensity (dB)
1	139.07	0.39	9.59	38.04	6.26	35.94
2	116.97	0.29	9.71	34.12	0.69	40.35
3	134.85	0.35	10.24	31.96	-0.12	47.52
4	133.08	0.64	7.50	34.69	3.72	31.15
5	134.50	0.37	5.94	35.67	4.88	23.78

6	132.40	0.32	8.45	39.20	3.19	35.47
7	129.79	0.35	8.69	36.21	5.67	25.58
8	205.52	0.33	8.26	34.73	10.95	46.47
9	128.26	0.32	8.24	33.47	1.04	42.77
10	127.89	0.36	7.67	33.82	-3.45	38.74
11	127.40	0.74	8.26	31.56	-3.45	65.52
12	134.21	0.30	7.20	35.94	6.68	35.28
13	217.70	0.33	7.06	28.98	-12.98	40.35
14	140.37	0.30	8.52	31.67	-6.30	37.82
15	138.27	0.33	7.31	30.93	-0.48	38.93
16	128.42	0.30	7.72	32.77	2.02	38.37
17	133.19	0.28	9.37	37.89	-0.29	34.57
18	133.08	0.35	8.64	36.49	4.06	40.03
19	123.20	0.37	9.85	28.72	-2.90	40.50
20	144.64	0.29	9.21	34.83	1.56	40.49
21	131.45	0.32	7.74	34.41	-5.93	37.17
22	132.95	0.33	7.83	38.03	0.76	51.67
23	129.06	0.34	6.85	34.04	3.76	32.10
24	129.44	0.33	8.30	34.13	2.81	40.53
25	141.93	0.32	7.30	38.43	-4.02	36.95
26	135.72	0.33	8.29	38.22	2.56	40.22
27	134.84	0.32	8.31	33.63	-5.40	41.24
28	147.21	0.28	9.85	37.68	5.09	36.79

29	137.21	0.31	7.48	34.00	-1.78	31.81
30	137.57	0.34	7.95	33.19	-0.87	42.22

Note. All acoustic analysis shown above are average across sessions. Speech rate is calculated from number of words in each utterance divided with duration in seconds (wps).

The table below shows the acoustic parameters of the teachers based on gender.

Table 25 Teachers' acoustic analysis based on gender

Teacher (Speaker)	Speech Rate (*sec*)	Fundamental Frequency (*Mean Hz*)	CPP (*dB*)	LTAS (*dB*)
Male	0.35	138.98	8.23	0.82
Female	0.31	134.32	8.38	-2.63

Note. Means of extracted acoustic measures were averaged across for the male teacher across 28 sessions, while there were only two sessions involving the female teacher from the data.

Pupils' Disclosure

Next, a multiple linear regression was conducted to examine whether the acoustic features of teachers' tone of voice predicted pupils' linguistic and emotional disclosure.

Each regression model predicted one disclosure variable as the outcome. The dependent variables included *word count, analytical thinking, authenticity, affect, positive tone, negative tone, and prosocial language* use. These variables were derived using LIWC software (Linguistic Inquiry and Word Count; Pennebaker et al., 2015). The results of the regression analyses are presented in Table 26, with standardised beta coefficients (β), t, significance levels (*p*-values), and R^2 reported for each model.

Table 26 Multiple Regression Results Predicting Pupils' Disclosure from Teachers' Acoustic Features Across 30 Sessions

Dependent variable	Predictor	B	t	*p*	R^2
Word Count	Speech Rate	0.71	1.33	.183	.001
	Pitch (mean F0)	0.01	2.71	.007*	.006
	LTAS (0-2000 dB)	0.02	.95	.342	.001
	LTAS (5000-8000 dB)	0.00	.20	.843	.000
	CPP	0.12	2.16	.031*	.004
Analytic	Speech Rate	-.68	-.12	.906	.000
	Pitch (mean F0)	-.08	-2.01	.045*	.003
	LTAS (0-2000 dB)	-.32	-1.26	.208	.001
	LTAS (5000-8000 dB)	-.04	-.34	.738	.000
	CPP	-1.09	-1.84	.066	.003
Authentic	Speech Rate	10.01	1.63	.103	.002
	Pitch (mean F0)	0.17	4.23	<.001**	.014
	LTAS (0-2000 dB)	0.22	.82	.415	.001
	LTAS (5000-8000 dB)	-.02	-.14	.888	.000
	CPP	1.65	2.62	.009*	.005
Tone	Speech Rate	-.78	-.23	.822	.000
	Pitch (mean F0)	0.01	.47	.641	.000
	LTAS (0-2000 dB)	0.09	.57	.568	.000
	LTAS (5000-8000 dB)	0.03	.39	.696	.000
	CPP	-.30	-.83	.404	.001

Linguistic	Speech Rate	4.30	1.04	.299	.001
	Pitch (mean F0)	0.01	.51	.612	.000
	LTAS (0-2000 dB)	0.03	.18	.860	.000
	LTAS (5000-8000 dB)	-.02	-.23	.817	.000
	CPP	.36	.85	.394	.001
Affect	Speech Rate	-2.32	-1.11	.269	.001
	Pitch (mean F0)	.01	.37	.709	.000
	LTAS (0-2000 dB)	.11	1.19	.236	.001
	LTAS (5000-8000 dB)	.01	.16	.876	.000
	CPP	-.18	-.81	.418	.001
Prosocial	Speech Rate	-1.35	-1.39	.164	.002
	Pitch (mean F0)	-.01	-2.20	.028*	.004
	LTAS (0-2000 dB)	-.09	-2.14	.032*	.004
	LTAS (5000-8000 dB)	-.01	-.55	.586	.000
	CPP	-.42	-4.19	<.001**	.014
Positive Tone	Speech Rate	-2.34	-1.13	.260	.001
	Pitch (mean F0)	.01	.53	.599	.000
	LTAS (0-2000 dB)	.09	1.01	.312	.001
	LTAS (5000-8000 dB)	.01	.17	.865	.000
	CPP	-.17	-.81	.420	.001
Negative Tone	Speech Rate	-.01	-.03	.980	.000
	Pitch (mean F0)	-.00	-.78	.438	.000
	LTAS (0-2000 dB)	.02	1.03	.301	.001

	LTAS (5000-8000 dB)	.00	.06	.954	.000
	CPP	.00	.02	.988	.000
Positive Emotion	Speech Rate	.01	.01	.994	.000
	Pitch (mean F0)	.02	2.22	.027*	.004
	LTAS (0-2000 dB)	.19	2.95	.003*	.007
	LTAS (5000-8000 dB)	.06	2.12	.034*	.004
	CPP	.36	2.36	.018*	.004
Negative Emotion	Speech Rate	-.02	-.07	.948	.000
	Pitch (mean F0)	-.00	-.77	.442	.000
	LTAS (0-2000 dB)	.02	1.22	.224	.001
	LTAS (5000-8000 dB)	-.00	-.31	.761	.000
	CPP	.01	.14	.887	.000

Note. †p<.10 *p<.05 **p<.001

Across the regression models, pitch and CPP were significant predictors of disclosure, although effect sizes were small (R^2 ranging from .003 to .014). Lower pitch and higher CPP were associated with increased word count, higher authentic disclosure, decreased prosocial content, and more expressions of positive emotions in pupils' verbal disclosure across 30 sessions.

Discussion

This study examined whether the acoustic features of teachers' tone of voice could predict pupils' linguistic and emotional disclosure. Analyses focused on four vocal parameters: pitch, speech rate, CPP (cepstral peak prominence), and LTAS (long-term average

spectrum) and eleven LIWC disclosure variables: *Word Count*, logical thinking (*Analytic*), honesty responses (*Authentic*), tone of disclosure (*Tone*), emotional words used (*Affect*), linguistic style of responses (*Linguistic*), prosocial languages used (*Prosocial*), *Positive Tone*, *Negative Tone*, *Positive Emotion*, and *Negative Emotion*.

Although the predictive strength of these vocal parameters was modest, pitch and CPP consistently emerged as significant predictors of *Word Count*, *Authenticity*, and *Positive Tone* disclosures. These findings suggest that subtle aspects of a teacher's vocal delivery may shape how openly pupils communicate, aligning with previous work highlighting the role of paralinguistic cues in interpersonal disclosure (Paulmann & Weinstein, 2023).

Voices with greater clarity (higher CPP) and pitch variation were linked to disclosure outcomes, potentially suggesting that subtler, less dominant vocal qualities may foster a greater sense of psychological safety. This aligns with research showing that softer, slower, and less forceful vocal delivery can reduce perceived pressure and encourage openness, whereas harsher vocal tones are often associated with more controlling communication styles (Paulmann & Weinstein, 2022, 2025; Weinstein et al., 2017, 2019; Vrijders et al., 2024). Overall, these findings support the idea that teachers' vocal characteristics can act as subtle cues shaping pupils' emotional climate and willingness to disclose during coaching-style interactions (Qin, 2022; Vrijders et al., 2024; Weinstein et al., 2018).

Furthermore, the finding that pitch variations (some high, some low) and higher CPP predicted pupils' disclosure (i.e., word count, authenticity, positive emotion), possibly

explained theoretically from autonomy-supportive communication literature (Hodis et al., 2023; Paulmann & Weinstein, 2025), also suggests that voices spoken with lower pitch variation and clear vocal production are perceived as more supportive and less controlling (Weinstein et al., 2018) which in turn impacted pupils' disclosure. While the observed effects were statistically small, their consistency across several disclosure outcomes strengthens the argument that tone of voice, even in subtle variations, plays a functional role in shaping pupils' verbal engagement. Pitch, often linked to power dynamics, with low voice pitch conveys impressions related to social power (Aung & Puts, 2020b), which could explain the influence on students disclosing with more honesty (*Authentic* Disclosure), increased word count and positive emotions when teachers' voices were spoken in a lower pitch. This aligns with another study that found teachers' voice pitch affected students' evaluation of the teacher and comprehension of the material (Augustin, 2018). Moreover, the idea that a lower, steadier pitch communicates calm authority and shows expertise (Sorokowski et al., 2019) might have created a space for pupils to speak more authentically. The implications are not trivial - even minor modulations in vocal pitch could potentially invite more genuine conversations in classroom settings.

CPP, often interpreted as a marker of vocal clarity or quality (Fraile & Godino-Llorente, 2014; Ludusan et al., 2021; Murton et al., 2020), also emerged as a meaningful predictor of disclosure. CPP significantly predicts authenticity and positive tone, suggesting that a clearer, more resonant voice may convey confidence or sincerity (Pearsell & Pape, 2023; Podesva & Callier, 2015), hence encouraging more positive emotional expression (Bakhtiar & Suwandi, 2022) from pupils. In contrast, a less clear voice might signal disinterest or uncertainty, which contributed to pupils being less open

in conversations. Additionally, a clearer voice may signal attentiveness or emotional availability, which could explain why higher CPP was linked to more authentic and emotionally positive pupil responses. This supports the perception that not only what is said, but *how* it is vocally delivered, can shape interpersonal dynamics.

The results did not support a strong link between teachers' LTAS and student disclosure, despite the theoretical claim that vocal energy (as measured through LTAS, especially at higher frequency bands) should influence listener receptivity (Leino, 2008). This could stem from contextual factors such as background noise, or it might indicate that LTAS is not as perceptually significant for listeners in classroom settings. LTAS is commonly affected by vocal loudness with spectrum levels strongly correlated to the overall sound level (Holmes et al., 2024; Titze & Palaparthi, 2020). Alternatively, the influence of LTAS might be more nuanced, interacting with other vocal parameters (Harwardt, 2011) or individual differences in student sensitivity to vocal energy. It is plausible that more subtle vocal cues, beyond mere energy levels, are at play (Järvinen et al., 2024; Koch, 2017).

Finally, speech rate, too, did not emerge as a reliable predictor. This may seem surprising given previous associations between slower speech and supportive tones impacting intentions to disclose (Paulmann & Weinstein, 2022). The result also did not align with teachers' acoustic studies that found that teachers who decreased their speaking pace (speech rate) while also spoke longer can also create a better learning environment (Järvinen et al., 2024). Although a slower speech rate is often perceived as more approachable, and more positively (Barranco-Droege, 2015; Cascio Rizzo &

Berger, 2025; Koch & Janse, 2016; Rocco et al., 2018), its effect might be contingent on other factors like pauses (Pritchett & Beatty, 2015), intonation, or individual listening preferences in an educational context. Despite the insignificant findings, speech rate should still be evaluated in future teachers' vocal studies and even integrated into teaching curriculum to ensure students' intelligibility and clarity of the message (Yurtbaşı, 2015).

Synthesising the findings, the data provide tentative support for the exploratory hypothesis. Although not all acoustic features demonstrated predictive capability, pitch and cepstral peak prominence, factors theoretically linked to perceived vocal warmth and clarity, exhibited significant associations with disclosure-related variables, particularly Word Count, Authenticity, and Positive Emotion in students' speech. Despite the modest strength of these associations, the observed pattern highlights that specific vocal characteristics may exert a subtle influence on student responses during teacher-facilitated interactions. However, these subtle acoustic cues must be understood within the broader context of classroom dynamics not included in the current scope of study, including teacher-student relationships, and pedagogical strategies (Chapman, 2007; Ding et al., 2022).

From a methodological standpoint, this research offers a glimpse into how teachers' vocal behaviours are linked to pupils' classroom participation (through the act of disclosing to the teacher), using multimodal methods from robust acoustic (teachers' tones of voice) and linguistics analysis (pupils' disclosure), contributing to new knowledge in understanding classroom communication. This study demonstrates the feasibility to

explore teacher-student dynamics in educational interactions. This multimodal approach, through exploratory design combining PRAAT-derived acoustic measures with LIWC-based linguistic analysis, provides insights into examining nonverbal influences via tone of voice on classroom communication. Future studies could incorporate subjective ratings of teacher voice to compare objective acoustic measures with student perceptions.

Future Recommendation and Conclusion

The current study explored specifically the direct effect of teachers' acoustic characteristics on pupils' disclosure across thirty sessions. Pitch and CPP (vocal clarity) were two significant predictors of pupils' psychological disclosure in terms of Word Count, Authenticity, and Positive Emotion. There could be other factors and nuances affecting pupils' disclosure that could be explored and analysed, such as the strength or closeness of the teacher-student relationship, the gender of the teacher with the student (male teacher with male student versus female teacher with male student), and cultural or contextual expectations regarding disclosure, and how encouraging or supportive the teachers were as they build rapports with the students. Ideally, this could be analysed through a qualitative lens of either interpretative phenomenological approach (IPA) of students' personal experiences, or thematic analysis of disclosure patterns. Furthermore, exploring the role of teachers' voice quality in teaching effectiveness is warranted, as vocal parameters such as pitch, volume, tempo, articulation, pronunciation, and fluency are key elements in shaping students' positive engagement and learning experiences (Ochoma, 2019).

CHAPTER 5

GENERAL DISCUSSION

Overview of all studies

This thesis presented nine empirical studies across three main chapters, each designed to examine the influence of tone of voice on listeners' affective and behavioural responses. These studies offer rich empirical evidence, consolidating how tone of voice is not merely a non-verbal communication tool, but, in fact, a powerful feature that shape relational outcomes and listeners' affective states. Together, these studies point to the subtle shifts in *how something is said*, rather than merely what is said, have measurable consequences for listeners' emotional wellbeing, willingness to disclose information, and perceptions of relationship quality. A brief summary of each chapter is presented, before diving into the overall practical, methodological, and theoretical implications.

Chapter 2 focused on one core prosodic pattern: an interested-sounding voice, tested against an uninterested-sounding counterpart. Participants spanned different cultural backgrounds, including English-speaking (American and British) and Asian (Chinese and Indian) speakers and listeners. The extension to capture cross-linguistic and cross-cultural variation is crucial given the participants' different tonal and intonational systems. It allows for the generalizability of these prosody research findings, avoiding biases that are often rooted in English-centric data.

Moreover, this work builds on existing emotional prosody research (Banse & Scherer, 1996; Pell et al., 2009; Simon-Thomas et al., 2009), but extends the field to

include attitudinal prosody. The goal to investigate whether signalling interest could elicit disclosure and meet basic psychological needs (relatedness and autonomy) has also not been explored in this sub-field previously. A mini meta-analysis of all three studies in this chapter consolidated evidence across experiments, offering a balanced interpretation of how these voice cues shape listener responses cross-culturally.

Chapter 3 continued to provide evidence for the influence of attitudinal prosody on listeners. Specifically, six distinct voices were explored, including friendly, unfriendly, praising, encouraging, condescending, and critical voices. The first study in this chapter explored friendly (in relative to unfriendly) voice use in six different social interactions, while the subsequent two studies focused on workplace settings. Key outcomes showed that friendly voices fostered self-reported wellbeing (positive affect), as well as praising and encouraging tones of voice, which elicited closeness (relatedness), work commitment, and flourishing behaviours from the listeners. The findings, thus collectively demonstrate that the “positive” quality of the voice can positively influence how people feel about themselves and their tasks, boosting their psychological wellbeing (flourishing) and increasing their work commitment. It implies that prosody isn't just a linguistic feature but also a social and emotional cue that shapes human behaviour and experience. These findings indirectly contribute and support adjacent literature classifying positive emotions within vocal expression (see review Kamiloğlu et al., 2020) where admiration, whereby in our study, is the praising voice could be categorised as prosocial positive emotions, while showing interest (Chapter 2) is categorised as epistemic states theorised as emotions that change individuals’ knowledge about the world.

Chapter 4 applied the findings in the first two chapters to more real-life-application contexts where voice cue use may have particularly pronounced effects, namely. healthcare, workplace, and education. Across three applied studies, this thesis demonstrated that tone of voice predicted meaningful interpersonal outcomes: general physicians (GPs) sounding interested enhanced patients' psychological disclosure, perceived instrumental support, and satisfaction with the GP if they were to experience a mental health issue; managers using praising or encouraging voices enhanced employees' work commitment and flourishing; and teachers employing an autonomy-supportive voice elicited greater student disclosure in one-to-one academic sessions. Together, these applied studies underline that tone of voice is not simply a stylistic choice but a communicative tool with the potential to influence relationships and wellbeing across diverse environments.

Showing an Interest through the Voice is Key

Interest as a vocal signal has appeared in several studies on acoustic profiles of emotion (Banse & Scherer, 1996; Goudbeek & Scherer, 2010; Laukka et al., 2016; Scherer, 1972; Van Bezooijen et al., 1983) but has rarely been isolated and tested for its effects on listeners. The current thesis (Chapter 2) is, to my knowledge, the first to demonstrate that signalling interest through tone of voice alone, while keeping the spoken words constant, can positively affect listeners' basic psychological needs (relatedness and autonomy) and alter their disclosure patterns. When speakers sounded interested, listeners reported increased closeness to the speakers, autonomy satisfaction and often produced responses reflecting greater authenticity and emotional tone in their disclosure (Study 2.1).

The results also extend beyond single-culture findings. Interest expressed vocally produced similar positive effects in Western (British and American) and Eastern (Chinese and Indian) listener groups, supporting the idea that certain prosodic cues may have universal relevance (Laukka et al., 2016). Cross-cultural differences in how voices are perceived by listeners and impacting their relatedness to the speaker, feeling autonomy and having the intention to help the speaker, demonstrate the benefits of sounding interested, suggesting that vocal prosody might function as a relational signal that extends beyond linguistic and cultural boundaries. On the contrary, our results show that sounding the opposite way, i.e. not being interested in what the listener has to say, results in undesirable outcomes such as reduced closeness and less willingness to disclose to the speaker.

Additionally, our applied healthcare study on physicians showing an interest through their tone of voice (Study 4.2) produced similar results to the cross-cultural study (Study 3.3). In line with Zolnierek et al., (2008), the authors found that health professionals who show engagement and warmth contributed to patient satisfaction based on the reciprocal messages of the physician and their patients, thus supporting the emotional contagion theory (Hatfield et al., 1993). The study employed a naturalistic design of analysing analogue audiotape recordings of each physician–patient interaction in the medical visit that were made, therefore, no prior instructions on what the physician should sound like was given. The study further explained that when the physician's tone of voice was warm/supportive and competent/interested, patients reported that they were given more choices/ control, were more satisfied with their physician's communication, felt they were given more information, and had greater trust in the physician. When the physician's

tone of voice was more enthusiastic, patients similarly had greater perceptions of choice/control and trust. The more hostile/disrespectful the physician's voice tone was rated, the less patients reported that they received information, felt their concerns were addressed, and assessed the physician's use of humour to be appropriate. Patients' self-reported medication adherence was positively correlated with physicians' enthusiastic, warm/supportive, and competent/interested tone of voice. Our study extends on this through systematic investigation, that just by showing an interest in the patient through the tone of voice (defined as showing care, curiosity about the patient and being approachable) could result in many beneficial outcomes, including closeness to the physician and confidence in their competence to provide support. Our study builds on previous findings by showing that when physicians intentionally modulate their voice to convey interest, patients report feeling closer to their GP and more confident in their ability to provide support. This suggests that prosodic shifts can foster a stronger therapeutic relationship and enhance perceptions of physician competence. Similarly, Greene et al., (2012) investigated patients' likelihood of disclosing non-visible physical or mental health-related information based on the disclosure decision-making model (i.e., the underlying motivations on why people disclose) from self-reported surveys, showing that the relationship closeness matters when disclosing their health condition to potential recipients of the information.

These findings carry important implications for communication strategies through sounding interested. Prior work has shown that voices signalling autonomy-supportive can promote need satisfaction (Weinstein et al., 2018). The present results add to this by showing that expressing curiosity through an interested-sounding voice can encourage

psychological self-disclosure, including providing replies that demonstrate more authenticity, increase use of affective words, and display a more overall positive tone when sharing information. In applied settings, such as healthcare consultations or performance reviews, demonstrating interest vocally may help create environments where people feel valued and understood, and this may become useful when healthcare professionals have limited time or when sensitive issues are discussed.

Attitudinal Prosody: Intention through the Voice Matters

Beyond interest, this thesis explored a wider range of attitudinal voice cues, revealing how vocal signals of intent can shape listeners' affect and behaviour. Voices sounding praising, encouraging, and friendly consistently promoted positive outcomes, including improved work commitment and feelings of closeness to the speaker (Chapter 3). In contrast, voices sounding condescending or critical undermined these same outcomes, often lowering perceptions of relationship quality with the speaker (Studies 3.2 and 3.3). The results suggest that vocal prosody can amplify or mitigate the social meaning, even when neutral words that were not biased toward one intentional speech were used (i.e., expressions or sentences that are applicable in both praising and condescending contexts). Identical statements delivered in a condescending tone, for instance, elicited negative affect and reduced commitment to the task and resulting in less engagement, whereas the same statements delivered in a praising tone improved relational perceptions. This finding aligns with work on condescending linguistic strategy (Holmberg, 2008), suggesting that even showing condescension through vocal intention, *how* something is said, can be as impactful as explicit verbal content.

Moreover, these studies contribute to the underexplored field of social or attitudinal prosody (Mitchell & Ross, 2013), where prosodic cues are conceptualised as signals of intent through voice cues. By identifying specific acoustic profiles associated with sounding friendly, unfriendly, praising, encouraging, condescending, and critical voices (summarised below in Table 27), the thesis provides methodological tools for future research. These tools make it possible to isolate and test how these distinct prosodic attitudes influence wellbeing and highlight the importance of subtle differences in the tone of the voice that can shift listeners' affective state, and even their work commitment.

Tone of Voice: The Forgotten Non-Verbal Across Contexts

Tone of voice, a non-verbal communication feature, can sometimes be overshadowed by verbal content or other non-verbal cues like facial expression and gesture (Moridis & Economides, 2012). Yet, findings from this thesis indicate that voice prosody, particularly when it conveys attitudes like interest, encouragement, or criticism, plays a critical role in shaping interpersonal outcomes across contexts.

In healthcare, even brief consultations between GPs and patients benefited when physicians used an interested-sounding voice. Patients reported greater closeness to the GP, expressed higher satisfaction with the consultation, and demonstrated a greater willingness to disclose sensitive information, including personal and health-related issues (Study 4.2). These results support the notion that relational quality in healthcare is not solely determined by medical competence (Levinson et al., 2008; Ruben et al., 2017) but also by how care is communicated through the non-verbal tone of the physicians. Tone of voice may therefore act as an accessible, modifiable behaviour that enhances patient experience without requiring additional consultation time or changes in verbal content.

Similarly, findings within the workplace reinforce this pattern. Managers who used praising and encouraging voices fostered stronger work commitment and greater flourishing among employees (Study 4.1). On the contrary, managers using condescending or critical voices, even when delivering identical messages, risked souring the relational closeness and discouraging employee commitment to the tasks. Office politics can sometimes create a condescending environment, particularly in the way leaders speak to their subordinates (Lair et al., 2008), and our findings show that even the intention of sounding condescending or critical brings undesirable outcomes at the workplace. Organisations and leadership management that are serious about employees' commitment at work or satisfaction can start with a communication style that builds positive relationships (Anderson et al., 2001), and our thesis demonstrates that using praising or encouraging voice could result in higher work commitment and engagement among employees.

Moving to the next context, namely education, findings complement these applied studies by focusing on teachers' autonomy-supportive voices in personalised academic sessions with the students (Study 4.3). Teachers' low pitch and clearer voice quality were found to predict greater student disclosure and engagement, which highlights the powerful effect of teachers using voices that promote support and autonomy. Most importantly, our study shows that in a natural, one-on-one session that is designed to support and guide students throughout their learning process, teachers who use autonomy-supportive voices indirectly encourage students to be more engaged and disclose even personal information to the teachers. This is an important discovery in shaping students' experiences and building positive relationships with their educators.

While prior literature has emphasised teacher communication skills broadly (Barida & Muarifah, 2018; Henderer, 1971), this expands on recent research on the role of teachers' motivating voice using autonomy-supportive tone within the educational environment (Paulmann & Weinstein, 2023, 2025).

The observed effects of vocal tone on listener wellbeing must be considered within the broader communicative context, including the social hierarchy and the nature of the message content (e.g., semantics). While higher-status speakers (e.g., managers in Studies 3.2 and 3.3; General Practitioners in Study 4.2) may exert a more profound influence on wellbeing due to their institutional authority, results from Study 3.1 suggest that these effects occur even in horizontal, same-level interactions with friends or librarians. This indicates that vocal prosody functions as a primary social signal independent of formal power dynamics. Therefore, the findings highlight that while social context and message type provide the framework for interaction, the affective influence of the tone of voice remains a robust predictor of psychological outcomes across diverse interpersonal scenarios.

Collectively, these results suggest that tone of voice deserves greater attention as a non-verbal communication channel. Its effects appear robust across distinct domains, and its influence extends beyond momentary affect, potentially shaping ongoing relationships and behavioural patterns.

Theoretical contribution

The findings reported here advance several theoretical perspectives on communication and relationships.

The Brunswikian lens model (Scherer et al., 2002) offers a powerful framework for understanding how vocal prosody functions as an environmental cue that listeners use to make inferences about speaker intent, emotional state, and relational stance. Traditionally, this model has emphasised the perceptual accuracy of such inferences, how reliably listeners can decode internal states from vocal signals. However, the current research extends this framework in two key ways. First, it highlights that vocal prosody not only shapes perceptions (e.g., judgments of interest, encouragement or condescension) but also actively shapes listeners' behaviours. This includes relational behaviours such as self-disclosure, compliance, and work engagement, as well as intrapersonal outcomes like self-esteem and the satisfaction of basic psychological needs. Second, it suggests that prosody serves not only as an indicator of speaker affect or disposition but also as a relational affordance, a cue that invites or constrains certain types of social engagement. In doing so, this thesis' work broadens the Brunswikian approach from a perceptual model of cue utilisation to a dynamic, interactional model of socio-emotional influence, with implications for theories of motivation, interpersonal regulation, and communication effectiveness.

Integrating insights from Self-Determination Theory (Deci & Ryan, 2000), one can hypothesise based on the current data that vocal signals can either support or thwart the fulfillment of basic psychological needs for autonomy, competence, and relatedness. For instance, a warm and interesting tone may signal relational openness, fostering self-disclosure and a sense of relatedness; an autonomy-supportive and affirming tone may bolster feelings of encourage engagement; and an uninterested or condescending tone of voice may undermine autonomy and motivation. This expanded lens model thus frames

prosody as a form of relational scaffolding, a means through which speakers can (intentionally or not) communicate support for listeners' psychological needs, shaping not only how they are perceived but how others feel, behave, and connect. In this way, vocal cues are not just passive signals to be interpreted, but facilitators in the social regulation of motivation and wellbeing. This framework offers a novel bridge between affective communication theories and motivational psychology, advancing our understanding of how interpersonal tone of voice can serve as a mechanism for both relational alignment and psychological flourishing.

Second, Social Penetration Theory (Altman & Taylor, 1973; Carpenter & Greene, 2015) posits that self-disclosure is a key mechanism for developing interpersonal closeness. The healthcare and workplace studies (Studies 4.1 and 4.2) demonstrate that tone of voice can act as a facilitator of this process, making listeners more willing to share personal information (e.g.: measured through increased linguistic styles and affective words such as positive tone disclosure) and strengthening relational bonds (i.e.: increased perceived closeness to the speakers). Importantly, these effects emerged even when verbal content was controlled, underscoring the independent role of vocal tone in relationship-building processes.

Third, Relational Motivation Theory ('Relationships Motivation Theory', 2023) highlights how supportive communication can fulfil basic psychological needs (in our thesis: autonomy and relatedness). Results from Chapters 2 and 4 align with this theory: voices signalling interest, praise, or encouragement enhanced perceptions of being understood and valued, which in turn promoted relational closeness and positive affect. The thesis, therefore, provides empirical support for integrating prosody into models of

supportive communication and relational development. Taken together the manipulated tones of voice throughout this whole thesis and the influence on affective, behavioural and motivational outcomes, a proposed model is developed (see Figure 7 below).

Figure 7 Proposed Prosody Model in Relation to Wellbeing and Disclosure Outcomes

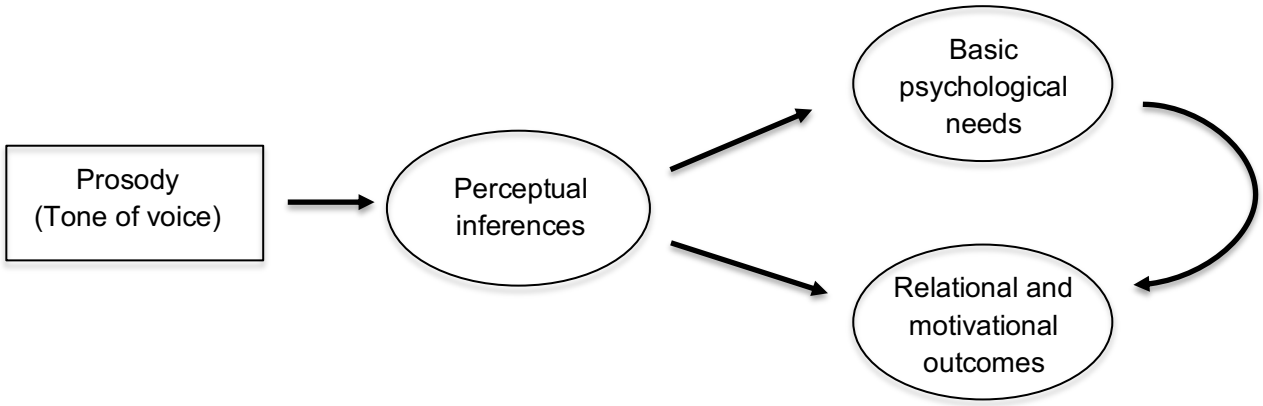

Figure 7 provides a conceptual model illustrating how tone of voice shapes wellbeing and disclosure outcomes through listeners' perceptual inferences. The model suggests that vocal tone influences how listeners interpret emotional and interpersonal cues, which in turn affects their satisfaction of basic psychological needs (such as autonomy and relatedness) and drives relational and motivational outcomes such as self-disclosure and work commitment. The model highlights prosody as a subtle yet powerful mechanism for fostering psychological safety and deeper interpersonal connection.

Another key contribution from the current thesis is the vocal profile of eight tones of voice developed from empirical evidence. The table below shows the definition of the vocal acoustics and their parameters, gathered from all studies. These findings could inform future research on what a certain voice would sound like, as well as the characteristics of the specific tone of voice.

Table 27 Summary of Acoustic Parameters for Different Vocal Patterns for All Studies

Voice Conditions	***Definitions used in the study***	***Speakers' Acoustic Parameters***			
		Pitch, Mean F0 (Hz)	***Speech Rate (seconds)***	***LTAS Mean (dB)***	***CPP (dB)***
Interested	demonstrates warmth and shows a strong interest and excitement towards the listeners to make them feel understood, listened to, and cared for	204.99	3.93	3.26	33.18
Uninterested	shows no interest in prolonging the conversation, making listeners feel uncared for, and the speakers asked out of necessity	174.52	3.87	2.81	32.66
Friendly	shows friendliness, approachable, ready to help	233.84	4.60	9.78	30.55
Unfriendly	signals unapproachable, unfriendliness	196.12	4.33	8.64	31.12

Praising	showing genuine admiration or support for the person's contributions e.g. their intellect and innovative ideas.	209.20	2.85	-2.32	27.48
Condescending	convey a sense of superiority while devaluing the other person and making them feel small, insignificant, unworthy of respect and whose ideas are always unhelpful	153.83	2.73	-4.27	28.14
Encouraging	show encouragement and persuasion to someone they thought had talent but lacked confidence or determination to succeed using a helpful, encouraging tone to improve the individual's effort and confidence	222.65	3.34	-2.43	28.77
Critical	demonstrates criticality through dissatisfaction, focusing on the person's errors, failings, and shortcomings to someone who repeatedly made the	181.41	3.06	-2.17	29.38

	same mistakes despite receiving guidance and help				
Autonomy-supportive	showing support while giving autonomy to the person	139.14	0.35	35.00[*1] 1.16[*2]	8.19

Note. For interested and uninterested-sounding voices, means of extracted measures were averaged across speakers for series of studies in Chapter 2 (2.1-2.3) and Study 4.2 on GP interested vs uninterested voices. Speech rate was calculated using the number of syllables in an utterance and dividing this by the utterance in duration (seconds), except for autonomy-supportive study which measured speech rate by number of words in an utterance divided by duration. LTAS for autonomy-supportive was analysed based on the low (*1: 0-2000 Hz), and high (*2: 5000-8000 Hz) frequency band range. The acoustic data in Excel extracted from VoiceLab (or PRAAT for autonomy-supportive) is available on osf.

Methodological contribution

This thesis makes several methodological contributions to the study of vocal communication.

First, it employed non-professional actors as speakers, producing vocal stimuli that more closely resemble everyday speech. Much of the emotional prosody literature relies on professional actors who may not always represent everyday speakers who are not professionally trained (Scherer & Rosenthal, 2008). By demonstrating effects with subtle, naturalistic voices by non-professional actors, this research provides stronger evidence that tone of voice matters in everyday interactions.

Second, the studies controlled for verbal content across conditions. Particularly, identical statements were delivered in praising versus condescending tones or interested versus uninterested tones, isolating semantics (words) as the causal factor. Furthermore, our attitudinal prosody design extends beyond the common emotional prosody research examining basic emotions such as happiness, sadness or anger (Banse & Scherer, 1996), thereby, this thesis provides additional various prosodies that are otherwise less explored. Moreover, rather than using pseudo-sentences to modulate the voices, our studies applied real, conversational sentences depicting distinct, validated tone of voice either to show expression (Chapter 3) or ask questions to strangers (RCIT; Chapter 2).

Third, multiple analytical approaches were integrated. Linguistic analysis using LIWC (Tausczik & Pennebaker, 2009) enabled a detailed assessment of disclosure content, while acoustic analysis using PRAAT (Boersma & Weenink, 2024) or AudioLab examined parameters such as pitch and speech rate, giving a deeper understanding of both the production and perception of vocal cues. Given that we are the first study to

investigate the effects of tone on voice on self-disclosure, multimodal methods in prosody research offer a model for future studies that can connect acoustic properties with psychological and relational outcomes.

Finally, this thesis introduces clear definitions for the attitudinal voices measure, such as interested, encouraging, and condescending, that are validated by listeners to illustrate what each voice type actually sounds like. In addition, acoustic profiles (e.g., pitch, speech rate) were provided for each prosody. In contrast, past studies often referred vaguely to an “appropriate tone of voice” (Fata & Aluş Tokat, 2022) or “considerate tone of voice” (Carpentier & Mageau, 2013) without offering definitions or examples. Thus, in this thesis, by combining listener-validated definitions with acoustic profiles, this thesis offers concrete reference points for future experimental work, reducing ambiguity about what distinguishes, for instance, an “encouraging” voice from a “critical” one.

Practical Implications & Future Recommendations

The findings across this thesis have clear implications for real-world communication. Tone of voice is not just one feature of verbal speech but a practical tool that can enhance or undermine interpersonal relationships across multiple contexts. Focusing on Chapter 4, where all studies were linked to an applied context, with one study using data from real-world, naturalistic conversation, all three studies highlight that voice cues are more than just exchanging, conveying, or asking for information.

Healthcare

In healthcare, physicians often have limited time with patients, and much emphasis has been placed on communication skills training focused on what to say. The current findings suggest that *how* physicians speak can be equally critical. An interested-sounding voice (defined here as showing care, curiosity, and approachability) encourages greater disclosure, improves perceived relational closeness, and enhances patient satisfaction (Study 4.2). Future interventions could integrate voice modulation training into medical education, showing clinicians how to sound interested without necessarily extending consultation time. Such training might prove especially useful when discussing sensitive topics, where patient disclosure is often crucial for accurate diagnosis and treatment.

Workplace

For managers, vocal tone offers a straightforward yet powerful way to influence employees' commitment and wellbeing. Praising and encouraging voices foster greater work commitment and flourishing (Study 4.1), while condescending or overly critical voices risk damaging relational trust and reducing work commitment. This suggests that leadership development programmes could include explicit training on vocal delivery, helping managers balance authority with encouragement. However, this does not mean that critical or directive tones have no place; rather, they must be applied with intention and context sensitivity, ensuring that feedback aimed at improving performance does not harm motivation or relationship quality.

Education

Teachers using an autonomy-supportive tone of voice elicited student disclosure and engagement (Study 4.3), expanding prior autonomy-supportive research in education

(Paulmann & Weinstein, 2023). These findings complement broader research on teacher-student relationships and highlight tone of voice as a tangible, modifiable skill. Professional development programmes for educators could incorporate vocal awareness training, differentiating between classroom authority and one-to-one support sessions where autonomy support, or even showing an interest in the student, is crucial.

Broader communication contexts

The implications extend beyond these formal settings. Given the positive outcomes of sounding interested (or even friendly in Study 3.1) in our research, marketing brands that aim to foster closeness and openness with their consumers (Barcelos et al., 2018) can benefit from our findings. These findings, thus, also provide empirical support for "watching your tone" in the marketing field (Barcelos et al., 2018).

The effects observed in this study should be understood as context-dependent rather than solely attributable to speakers' vocal characteristics in isolation. In mentoring interactions, tone of voice likely operates within a reciprocal speaker–listener dynamic, where teachers' prosodic cues both influence and respond to pupils' engagement and disclosure. These dynamics may be further shaped by the social hierarchy inherent in teacher–student relationships, which may heighten pupils' sensitivity to vocal signals of interest, warmth, or authority. Taken together, these contextual factors suggest that the associations reported here reflect interactional processes embedded within specific relational and situational effects of tone of voice.

The present findings also have implications for the design and evaluation of AI-mediated communication systems. The observed associations between speakers' prosodic features (e.g., pitch, speech rate) and listener's disclosure suggest that tone of

voice functions as a substantial social signal. For conversational AI, this highlights the importance of modelling not only what is said, but *how* it is said (in other words, expressed to sound as human-like as possible), particularly in contexts that involve support, guidance, creating a positive environment and motivating listeners. Incorporating context-appropriate prosodic modulation into speech-based AI systems may help foster greater user engagement, trust, and openness, for instance, in interactions such as over the phone customer support. More broadly, these findings demonstrate the value of informing AI communication design in empirically derived, evidence-based human interaction patterns rather than purely technical optimisation.

Future Recommendation and Limitations

Future studies should test whether these effects persist over time. Do positive tones enhance personal relationship satisfaction and contentment while negative tones erode it over time? Longitudinal designs could investigate whether consistent exposure to positive-valence voices contributes to long-term flourishing, perhaps operationalised using the whole PERMA-flourishing model (Positive Emotion, Engagement, Relationships, Meaning, Accomplishment). Other work could explore how tone of voice influences relationships in high-stakes contexts (e.g., crisis negotiations, legal settings) or in fully remote environments where voice may be the primary communicative channel (e.g., telemedicine, virtual teams). Several limitations that can be improved in future research are highlighted.

First, disclosure measures varied across studies, ranging from text-based responses (Chapter 2 and Study 4.1) to naturalistic speech (Study 4.3). While this allowed examination of multiple facets of disclosure (e.g., length, authenticity, emotional tone), it

analysed disclosures using robust software that captures the responses quantitatively. Future research could incorporate both quantitative and qualitative measures by including human raters and automated linguistic analyses to capture the nuances of disclosure more comprehensively.

Second, the studies primarily examined the short-term effects of tone of voice. While brief interactions can have meaningful impacts, especially in contexts like healthcare consultations or one-off workplace meetings, long-term relational dynamics remain underexplored. Longitudinal studies could determine whether consistent tone-of-voice patterns build enhanced relationship quality or influence long-term wellbeing, including flourishing outcomes.

These limitations, however, do not reduce the validity of the thesis; rather, these are outside the focus and scope of the current thesis.

Conclusion

Taken in their totality, these findings provide new empirical evidence on the distinct yet powerful role of speakers' tone of voice on listeners' emotional wellbeing (all chapters except Study 4.3), psychological disclosure (Chapters 2 and 4), and state of the relationship (all chapters). From this thesis, examples of the state of the relationship include feeling closer to the speaker (Studies 2.1 – 4.1), being satisfied with the physician's services (Study 4.2), and having higher commitment and motivation to work (Studies 3.2, 3.3 and 4.1). Although self-disclosure was not consistently impacted by the different voice conditions across all studies, the partial influence on disclosure, such as authentic words used, positive tone in disclosing, still provides valuable information on

how a small change in the tone of voice can indirectly impact how listeners think and respond (i.e., disclose).

These results challenge the notion that communication effectiveness is determined primarily by word choice (Alghowinem et al., 2021; Boyd et al., 2021). Instead, this thesis demonstrates how something is said can fundamentally change how it is received and reacted to. In healthcare, an interested tone can foster openness and relational trust. In workplaces, praising and encouraging voices can motivate employees and support flourishing. In education, autonomy-supportive tones can enhance engagement and disclosure.

Theoretical contributions include extending models like the Brunswikian lens, Social Penetration Theory, and Relational Motivation Theory to incorporate prosodic cues as active tools to utilise interpersonal processes by modulating the voice accordingly. Methodologically, the thesis contributes validated definitions and acoustic profiles for attitudinal voice cues and demonstrates that subtle, non-professional vocal modulations are sufficient to influence listener responses.

Practically, these results highlight tone of voice as a modifiable, high-impact communication behaviour. Whether in professional or personal contexts, intentionally using positive-valence tones has the potential to improve relationships, encourage openness, and support wellbeing. In short, *how we say something can be as important, if not more important than what we say.*

The current thesis, therefore, has answered the overarching research question: that tone of voice, particularly positive-valenced voices, namely sounding interested, friendly, praising, encouraging, and autonomy-supportive, holds the ability to leverage

listeners' wellbeing and self-disclosure. Although not all positive-valenced voices lead to the same effects, as shown in our studies (for instance, a praising tone of voice enhanced flourishing outcomes, specifically, engagement and accomplishment of employees at work, while an encouraging tone of voice did not lead to the same effects). Moreover, past studies also emphasised the benefit of positive prosody (Dylman et al., 2025).

In sum, this thesis demonstrates that tone of voice is an instrument of connection, not just a by-product of verbal speech. Whether signalling interest, offering praise, or simply showing encouragement – through the tone of voice, the way we sound can shape how others feel, what they share, and how relationships grow. By highlighting tone as an evidence-based tool for improving wellbeing and social connection, this research offers a simple yet powerful message: *how we speak can change how we live and relate to one another.*

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Appendices

Appendix A

Questions for Interested and Uninterested-Sounding Tones of Voice (Chapter 2)

1) What is one habit you'd like to break and why?
2) What is one thing about yourself that most people would consider surprising?
3) Tell me, what are your hobbies?
4) What is one of your biggest fears?
5) What is one recent accomplishment that you are proud of?
6) If you could change one thing about yourself, what would that be?
7) Describe the last time you felt lonely.
8) If you could travel anywhere in the world, where would you go and why?

Appendix B

Questions/Statements for Friendly and Unfriendly Tones of Voices

Social Situation	Social interactions	3 questions/sentences
Friend	One afternoon, you met a friend whom you had not seen in a while. You started asking your friend about their life.	What is one of your biggest fears? What is one habit you'd like to break and why? If you could travel anywhere in the world, where would you go and why?
Stranger	You are sitting on a park bench on a weekend. You initiated communication with an elderly stranger sitting next to you.	What is one thing about yourself that most people would consider surprising? What is one recent accomplishment that you are proud of? If you could change one thing about yourself, what would that be?
Cashier	A customer is shopping by herself and wanted to look for a clearance sale item she saw advertised in your email. She cannot find the item and walks up to you for help.	Hi, what can I do for you? The clearance sale for the jeans just ended yesterday. There are discounts for other attires, if you want to check them out.
Librarian	A guy is at the local library to do some research on a project. He is	How may I help you?

	looking for a book from the special collection and needs help finding it.	Do you have the full title of the book? Books from the special collection can only be borrowed for 5 hours.
Neighbor	A neighbor is cleaning her yard on her off day on Wednesday morning. You passed by her house and greeted her.	How is your family? What are you up to this weekend? Have you spent a lot of time in the garden recently?
Spouse	You and your spouse are sitting in front of the TV. Both of you have been busy with work and the day-to-day chores that you barely have time to talk to each other. You finally have time to sit down and talk to each other now.	How was your week? Are you taking a day off next Monday? What was one thing that happened to you this week?

Appendix C

Questions/Statements for Praising and Condescending Tones of Voices

1) I actually like that idea.
2) You have done a wonderful job again.
3) This was your idea, wasn't it?
4) That's an interesting way to do it.
5) This is so cool.
6) You always know what to do.
7) You always have the right answer.
8) Your confidence is inspiring.
9) That was fascinating.
10) That's amazing.
11) Good for you.

Appendix D

Questions/Statements for Encouraging and Critical Tones of Voice

1) Did you do that right?
2) Repeat one more time.
3) Why don't you think of something else?
4) You should get it right this time.
5) Why not now?
6) Yes, the next step is important.
7) Some things are meant to change.
8) We'll get there if you put in the effort.
9) It's hard, but not impossible.
10) Practice makes perfect.