University of Essex

Research Repository

What Makes Parents Sound Controlling? Exploring Individual Differences in Autonomy Support, Psychological Control, Authoritarianism, and Stress

Accepted for publication in Parenting

Research Repository link: https://repository.essex.ac.uk/43257/

Please note:

Changes made as a result of publishing processes such as copy-editing, formatting and page numbers may not be reflected in this version. For the definitive version of this publication, please refer to the published source. You are advised to consult the published version if you wish to cite this paper.
https://doi.org/10.1080/15295192.2026.2667411

www.essex.ac.uk

University of Essex

What Makes Parents Sound Controlling?

Exploring Individual Differences in Autonomy Support, Psychological Control, Authoritarianism, and Stress

Berdien Vrijders, Maarten Vansteenkiste, Netta Weinstein, and Silke Paulmann

SYNOPSIS

Objective. When parents communicate with their children, their tone of voice plays a vital role in shaping their children's emotional and motivational reactions. Understanding why some parents use their voice differently from others, whether due to stable individual traits or situational factors, can provide insights into how parenting practices are expressed and how they affect children. This study investigates how individual differences in parents' characteristics, including autonomy support (supporting child choice and volition), psychological control (parenting through pressure, guilt, or coercion), authoritarian attitudes (beliefs that children should be obedient, respect, authority, and follow rules without negotiation), and stress levels, influence parents' vocal behavior during interactions with their children. ***Design.*** Using two samples of Dutch- (N = 210) and English-speaking mothers and fathers (N = 169), we analyzed acoustic properties of speech (i.e., pitch, amplitude, speech rate, and voice quality), during simulated parenting scenarios. ***Results.*** Mothers who reported higher levels of psychological control consistently articulated harsher-sounding voices. Mothers and fathers high on authoritarianism spoke more slowly than parents low on authoritarianism, whereas stress showed less consistent associations with vocal behavior. ***Conclusions.*** These findings highlight the role of differences in parenting practices, personality traits, and stress in the prediction of parental prosody in parent-child interactions.

Keywords: parent-child communication; vocal behavior; individual differences; specificity

INTRODUCTION

Parental communication plays a pivotal role in shaping children's emotional and psychological development (Hart et al., 2003). Among the various aspects of communication, the vocal behavior of parents significantly influences how children perceive and respond to their parents' messages (Vrijders et al., 2026; Weinstein et al., 2020). In vocal behavior, various acoustic features of speech, such as pitch, volume, voice quality, and speech rate, can provide important clues about the underlying intentions of parents and hence shape the parent-child dynamic in unique ways (Hellbernd & Sammler, 2016). However, to what extent the use of such acoustic cues varies as a function of parents' individual characteristics remains unclear. Understanding these variations can shed light on parenting practices, their impact on children, and ways to support healthier parent-child relationships. In the current research, we focused on parenting practices, authoritarian attitudes, and stress levels as three key parent characteristics, each of which has previously been linked to controlling or shaping parenting behaviors, and such behaviors are known to have detrimental effects on children (Soenens & Vansteenkiste, 2010). Parenting practices reflect parents' immediate communication behaviors, authoritarian attitudes capture broader beliefs about authority and obedience, and stress levels reflect contextual pressures that may influence parent–child interactions. Together, these characteristics provide insights into how individual differences among parents may be reflected in their vocal behavior toward their children.

Autonomy-supportive and Controlling Voices

Prior research has distinguished between autonomy-supportive and controlling parenting practices (Mageau & Joussemet, 2023; Ryan & Deci, 2017; Soenens et al., 2017). When autonomy-supportive, parents encourage their children's sense of initiative and acknowledge children's feelings and perspectives, which has been associated with a host of positive outcomes for children, such as higher intrinsic motivation, greater well-being, and greater

academic achievement (Bradshaw et al., 2025; Grolnick et al., 1991; Vasquez et al., 2016). In contrast, when parents are more controlling, they rely more on pressure and impose strict rules and expectations, often using more forceful, coercive, or guilt-inducing language to elicit compliance. Controlling parenting has been linked to maladaptive outcomes in children, such as feelings of helplessness and a lack of self-efficacy (Soenens & Vansteenkiste, 2010), reduced psychological well-being, lower self-esteem, and heightened risks of anxiety, depression, and externalizing behaviors (Barber et al., 2005; Laurin et al., 2015; Soenens et al., 2008).

Controlling and autonomy-supportive parenting behaviors are shaped not only by *what* parents say and do, but also by *how* they say things, which influences how messages are perceived and internalized by children. Indeed, 4- to 6-year-olds already pick up the differences between actor-spoken autonomy-supportive and controlling voices (Vrijders et al., 2026), with controlling sounding voices leading to increased feelings of pressure, anger, and fear as well as reduced closeness and a lower intent to collaborate with the speaker. Similar results were found for other age groups, with adolescents reporting increased defiance (Weinstein et al., 2020) and diminished closeness and well-being (Weinstein et al., 2018) and adults reporting higher felt pressure and lower intent to collaborate and closeness (Vrijders et al., 2025) in response to controlling as compared to autonomy-supportive sounding vocal expressions. Such results were found not only in the parenting context, but also in a teaching context, where pupils reported less basic psychological need satisfaction, well-being, and intent to disclose information when listening to teachers speaking with a controlling as compared to an autonomy-supportive voice (Paulmann & Weinstein, 2023).

These forms of vocal behavior can be differentiated by specific acoustic parameters that characterize them. When looking at the acoustic measures that define controlling and autonomy-supportive voices, it is not relevant whether someone speaks in a high or low voice,

fast or slow, but the dominant feature of a controlling sounding voice seems to link to energy produced in higher frequency bands (e.g., 1000–2000 Hz). Specifically, expressing speech with increased energy in this frequency range elicits perceptions of harshness (Vrijders et al., 2025; Weinstein et al., 2018, 2020). However, it remains unclear whether parents who generally adopt more autonomy-supportive or controlling parenting practices also express these tendencies through their vocal behavior when addressing their children.

Authoritarian Attitudes and the Voice

Beyond parenting practices, other parental characteristics may also shape how parents sound when speaking to their children. Although parents may be more likely to use controlling or autonomy-supportive tones in specific situations – for example, in a rushed moment to leave for school a parent may use more controlling tones – voice cues can also signal more stable speaker characteristics, such that the voice can tell us more about the personality or state of the speaker. For instance, lower-pitched voices are perceived as more socially dominant or influential (Klofstad et al., 2012; Puts et al., 2006), as are louder voices (Ko et al., 2015; Scherer et al., 1973; Tusing & Dillard, 2000) and voices with slower speech rate (Hughes et al., 2014; Tusing & Dillard, 2000). Furthermore, higher-pitched voices, but lower pitch variability, have been associated with higher social hierarchical rank (Ko et al., 2015).

Yet, it is still an open question whether parents' authoritarian attitudes may manifest through their voice as well. Authoritarian parents prefer order, a high degree of conformity, and obedience (Altemeyer, 1983; Duriez & Soenens, 2009), and they rely more on controlling behaviors, including the use of commands and punitive forms of communication (Adorno, 1950; Baumrind, 1966; Heydari et al., 2013). Also, authoritarian teachers tend to make use of more controlling teaching practices (Reeve et al., 2018). Yet, whether differences in authoritarianism are also reflected in parents' vocal patterns when addressing their children remains unclear.

Stress and the Voice

Another crucial factor that may affect parental vocal expression is parents' general stress levels (i.e., ones that transcend specific situations and broadly characterize longer spans of time). Whether stemming from economic hardship, work pressure, or parenting challenges, perceived stress predicts more controlling parenting (Van der Kaap-Deeder et al., 2019) and impacts communication patterns (Conger et al., 2002). At the same time, stress may also influence parental vocal expression more directly through heightened arousal or irritability. Under stress, parents may exhibit less patience, resulting in tones of voice that are irritable, anxious, or overly stern. Studies that have focused on acute, situation-specific stress (e.g., while giving a presentation) show that stressed speakers often communicate with a higher pitch (Giddens et al., 2013; Kappen et al., 2022; Sondhi et al., 2015), increased amplitude (Kirchhübel et al., 2011), and faster speech rate (Demenko & Jastrzębska, 2012). Moreover, stressed speakers tend to produce sharper-sounding speech, reflecting increased vocal tension and emotional strain (Braun et al., 2017; Van Lierde et al., 2009), and their speech may also become breathier due to altered breathing patterns (Murray & Arnott, 1993). Such vocal characteristics contribute to a sense of urgency and heightened emotional expression. A question is whether such acoustic correlates can be found for chronic stress levels as well as for motivationally rich parenting approaches.

The Present Study

Research on how individual differences in several personological variables relate to vocal characteristics of parental speech remains limited. To our knowledge, no prior work has examined whether theoretically meaningful parental characteristics systematically manifest in the vocal properties of parents' speech. Addressing this gap is crucial for understanding how parental characteristics, as reflected in vocal behavior, affect children, parents themselves, and the quality of the parent-child relationship. Here, we investigated four research questions:

Research Question 1:

(a) Do parents who are generally more *controlling* differ in the acoustic characteristics of their speech when instructing their children?

(b) Do parents who are generally more *autonomy-supportive* differ in the acoustic characteristics of their speech when instructing their children?

Research Question 2: Do parents who are generally more *authoritarian* differ in the acoustic characteristics of their speech when instructing their children?

Research Question 3:

(a) Do parents who are *generally* more *stressed* differ in the acoustic characteristics of their speech when instructing their children?

(b) Do parents who are more *stressed in relation to their child* differ in the acoustic characteristics of their speech when instructing their children?

We were interested in whether theoretically informed individual differences manifest in parents' vocal characteristics. We tested four key acoustic cues, namely pitch, amplitude, voice quality, and speech rate, to capture complementary aspects of prosodic expression that have been linked to dominance, control, and motivational communication in prior research. To test the robustness of these associations, we analyzed speech samples from two different language groups (i.e., Dutch-speaking and English-speaking parents), including both mothers and fathers and parents of children across different age ranges (i.e., narrow range in Sample 1, broader range in Sample 2). This design allowed us to examine whether the observed patterns would generalize across different linguistic and developmental contexts.

METHOD

Participants

Sample 1. Two hundred and ten Dutch-speaking parents were recruited through a developmental psychology course at Ghent University. As part of the course assignment, each

student visited one unacquainted parent at home and provided them with a link to the survey. Students remained in the household while parents completed the online survey. Parents completed the questionnaire independently in a quiet, separate room using their own computer. Parents were asked to produce short spoken responses, which were audio-recorded using the computer's built-in microphone. Participants whose audio excerpts did not meet quality standards or contained background noise, errors, or unnatural speech were excluded (n = 13).

The final sample consisted of 197 parents, including 102 mothers and 95 fathers (M_{age} = 36.73, SD_{age} = 5.37, $Range_{age}$ = 26-58). Parents had 2.17 children on average and were asked to focus on their child between 4 and 6 years of age for this study, as autonomy struggles and compliance issues are particularly salient during this developmental period (Deci et al., 2013). In case parents had multiple children in that age range, they were instructed to keep one of them in mind throughout the study. Parents thought of children who were on average 4.15 years old. Regarding parental education, 74.1% had a college or university degree, 24.9% had completed secondary school, and 1% had completed primary school. 90.4% of parents were married or living together.

Sample 2. One hundred and sixty-nine English-speaking parents were recruited via Prolific Academic (Peer et al., 2017). Again, participants' whose audio excerpts did not meet quality standards were excluded, resulting in a sample of 145 participants, including 73 mothers and 72 fathers (M_{age} = 40.70, SD_{age} = 7.50, $Range_{age}$ = 19-62). Parents had 1.73 children on average. They were instructed to keep in mind one of their children throughout the study. Parents thought of children who were on average 10.02 years old ($Range_{age}$ = 5-17), significantly older than children in Sample 1, $t(278.22) = -23.71$, $p < .001$. Regarding parental education, 92.2% of parents had a college or university degree, while the remaining

7.8% had completed secondary education. 71.8% of parents were married or living together, 27.6% single or divorced.

Procedures

Sample 1. Parents were tested in the comfort of their home, using a laptop to upload audio recordings directly to a custom-built online platform designed to ensure high-quality audio recordings. They were instructed to record themselves in a quiet environment. There, they were presented with one of three written descriptions of a parenting situation in which their child broke a certain rule. These situations were developed based on Social-Domain Theory (Smetana, 2006), with one situation reflecting a personal issue (i.e., individual preferences and choices outside societal regulation), one reflecting a moral issue (i.e., justice and others' well-being), and one reflecting a prudential issue (i.e., personal health and safety issues). Different situations were used to be able to generalize findings across different parenting domains. Parents were asked to imagine themselves in the situation with their child and to respond as they normally would, consistent with procedures used in prior experimental research (Paulmann & Weinstein, 2023; Weinstein et al., 2020). Overall, parents perceived the situations as moderately realistic (M = 3.3, SD = 1.4) and reported a moderate ability to empathize with the situations (M = 3.2, SD = 1.3) on 5-point Likert scales ranging from 1 = *completely disagree* to 5 = *completely agree*. Then, while recording themselves parents were instructed to speak a series of sentences as if they were addressing their child. In total, parents were asked to speak eight sentences (e.g., "You are not supposed to do that.") that were semantically identical across domains and age-appropriate for 4- to 6-year-old children (see Appendix A1 for the sentences used).

Sample 2. Parents were taken to the same online recording studio as described above. To further increase parents' ability to empathize with the situation, parents were presented with a short scenario that has been validated in previous research as both highly realistic (M =

4.3, *SD* = 0.7) and frequently occurring (*M* = 3.6, *SD* = 0.8) on 5-point Likert scales ranging from 1 = *completely disagree* to 5 = *completely agree* (Mabbe et al., 2026). This scenario was also appropriate for children across a broad age range. In this scenario, parents were instructed that they wanted their child to clean their room that afternoon, a situation pertaining to the conventional domain (i.e., social norms and the structuring of daily interactions; Turiel, 1989). Again, parents were asked to imagine themselves in the situation with their child and to respond as they normally would. Then, while recording themselves they were asked to speak the following sentences as if they were addressing their child. Parents spoke seven semantically identical sentences that were both age- and situation-appropriate (e.g., "Are you going to start cleaning up?"; see Appendix A2).

Measures

Autonomy Support. To assess parental autonomy-support, parents completed age-appropriate questionnaires. Parents in Sample 1 completed four items (e.g., "I always encourage my child to express his/her feelings.") from the Parents as Social Context Questionnaire – Toddler version (PSCQ-T; Zimmer-Gembeck et al., 2015), and parents from Sample 2 completed seven items (e.g., "I listen to my son or daughter's opinion or perspective when he or she's got a problem.") from the Perceptions of Parents Scale (POPS; Grolnick et al., 1991). Items were answered on a 5-point Likert scale ranging from 1 = *completely disagree* to 5 = *completely agree.* McDonald's omega totals in the current study were .75 for Sample 1 and .62 for Sample 2.

Psychological Control*.* To assess the degree of parental psychological control, parents filled in an age-appropriate version of the Psychological Control Scale (PCS-YSR; Barber, 1996). Items were answered on a 5-point Likert scale ranging from 1 = *completely disagree* to 5 = *completely agree.* This scale consists of eight items (e.g., "I regularly try to change my child's opinion.") and has been validated and used in past research (e.g., Brenning & Soenens,

2017). McDonald's omega totals in the current study were .76 for Sample 1 and .81 for Sample 2.

Authoritarianism. Parents completed the Right-Wing Authoritarianism scale, which addresses perspectives on authority, defiance, moral standards, traditional family values, sexual orientation and criminality (Altemeyer, 1983; e.g., "Obedience and respect for authority are among the most important virtues children should learn."). Items were answered on a 5-point Likert scale ranging from 1 = *strongly disagree* to 5 = *strongly agree*. This scale consisted of 14 items and has been used and validated in previous research (e.g., Duriez et al., 2007). McDonald's omega totals in the current study were .83 for Sample 1 and .84 for Sample 2.

S***tress.*** Two kinds of stress were measured. (1) For overall stress, parents filled in the Perceived Stress Scale (PSS; Cohen et al., 1983). Parents in Sample 1 filled in the 10-item version, parents in Sample 2 the 14-item version (e.g., "In the last month, I felt upset because something unexpected happened."). Items were answered on a 5-point Likert scale ranging from 0 = *never* to 4 = *always*. This scale has been used in Dutch (e.g., De Vries & Drent, 2004) and English (e.g., Soykan et al., 2019) samples. McDonald's omega totals in the current study were .87 for Sample 1 and .89 for Sample 2. (2) Stress in relation to the child was assessed using three items (e.g., "When I spent time with my son/daughter in the past week, I was very stressed.", "When I spent time with my son/daughter in the past week, I found it difficult to relax." and "When I spent time with my son/daughter in the past week, I noticed that I was very restless."). Items were answered on a 5-point Likert scale ranging from 1 = *strongly disagree* to 5 = *strongly agree*. McDonald's omega totals in the current study were .89 for sample 1 and .88 for sample 2.

Acoustics

Four acoustic measures were extracted from the spoken sentences with customized scripts using *praat* software (Boersma & Weenink, 2023). Specifically, *pitch*—mean f0 in Hertz was measured to assess how high or low the parent's voice was; *amplitude*—standard deviation of vocal intensity in decibels to assess the range of vocal loudness; *speech rate*—duration in s to assess how fast or slow the sentences were spoken; and *voice quality*—high-frequency energy in decibels to assess the sharpness or softness of the parent's voice. The standard deviation of amplitude was used instead of the mean because recordings were made in parents' home environments, where the distance between mouth and microphone could not be standardized. The standard deviation of amplitude reflects fluctuations in vocal intensity and is more robust under variable recording conditions. For the other acoustic parameters, mean values were extracted per spoken sentence.

Plan of Analyses

Preliminary Analyses. First, considering the design in which spoken sentences were nested within parents, we calculated the Intra-Class Correlation (ICC) to examine the proportion of variance attributable to between-parent differences versus sentence-to-sentence variability within parents. Higher ICC values, indicating a greater proportion of between-parent variance, supported the use of multilevel modeling. Second, sociodemographic variables, such as gender, age, type of education, marital status, and number of children, were tested as predictors of the outcome variables (i.e., pitch, amplitude, speech rate, and voice quality) using a linear mixed regression model, which appropriately accounted for the dependency of observations within parent pairs. Continuous predictors were centered and scaled. Given well-documented differences in parenting between mothers and fathers (Parke & Cookston, 2019), and to avoid assuming equivalence across parent genders, all subsequent analyses were conducted and reported separately for mothers and fathers. Last, we examined descriptive statistics and Pearson correlations among all variables.

Primary Analyses. After preliminary analyses, nonsignificant covariates were removed from the model. Then, linear mixed-effects regression modelling was used to test how parents' autonomy support (Research Question 1a), psychological control (Research Question 1b), authoritarianism (Research Question 2), and amount of stress (Research Question 3a and 3b), as between-subject predictors, affected the way parents used their voice, as reflected in the acoustic measures that define their speech. These predictors were entered simultaneously to estimate their unique associations while accounting for shared variance among the related parental characteristics. Continuous predictors were centered prior to analysis. For ease of interpretation, standardized regression coefficients (β) are reported. For each acoustic measure, a separate model was constructed, with parent included in the models as a random effect. Analyses were conducted in R Studio (R Core Team, 2021) from which the syntax is available on our Research Box [https://researchbox.org/4400].

RESULTS

Preliminary Analyses

Unconditional models to assess ICCs showed sufficient variability at the between-person level for both samples for conducting full models, with ICCs ranging from .16 to .86. Across samples, demographic characteristics showed small but consistent associations with vocal parameters. In Sample 1 (see Table 1), across mothers and fathers, older parents tended to speak more slowly and with a lower pitch, mothers spoke with a higher pitch, slower speech rate, and with more variation in volume compared to fathers. Additionally, more modest effects were observed for education level, relationship status, and family composition on pitch, voice quality, and speech rate (e.g., higher pitch among single parents and parents with more children). In Sample 2, mother or father status emerged as the most robust sociodemographic predictor: mothers spoke with a higher pitch and slower speech rate than fathers (pitch: $\beta = 0.79$, $t(1131.87) = 16.25$, $p < .001$; speech rate: $\beta = 0.10$, $t(1123.87) = 2.07$,

p = .04). No additional sociodemographic variables showed reliable associations with acoustic features in Sample 2.

Tables 2 and 3 display descriptive statistics and multilevel Pearson correlations (reported separately for mothers and fathers) between the different predictors (i.e., psychological control, autonomy support, authoritarianism, overall stress, and parental stress) and outcome variables (i.e., voice quality, amplitude, pitch, and speech rate) at the between-person level for Samples 1 and 2, respectively. Across both samples, psychological control was positively associated with voice quality and pitch among mothers, whereas this association was not significant among fathers. Autonomy support showed few associations with the acoustic variables. Authoritarianism showed associations with different acoustic features across samples and parent genders: In Sample 1 authoritarianism was positively associated with voice quality for both mothers and fathers, whereas in Sample 2 authoritarianism was positively associated with amplitude variability (*SD*) and speech rate among fathers. Stress-related variables showed less consistent patterns across samples and parent genders.

Primary Analyses

Table 4 summarizes findings on how parents' autonomy support, psychological control, authoritarianism, and stress were uniquely associated with acoustic characteristics of their speech. With regard to Research Question 1a, psychological control was consistently associated with voice quality among mothers in the two samples, with more controlling mothers speaking with a sharper-sounding voice. This pattern was not observed for fathers. With regard to Research Question 1b, autonomy-supportive parenting showed limited associations overall.

With regard to Research Question 2, authoritarianism was associated with slower speech rate and greater amplitude variation, although these associations differed across

samples and parent genders. Specifically, greater amplitude variation emerged for both mothers and fathers in Sample 2, whereas slower speech rate was associated with authoritarianism for fathers in Sample 2 and for mothers in Sample 1.

Finally, with regard to Research Questions 3a and 3b, stress-related variables showed heterogeneous and largely sample-dependent associations with acoustic characteristics, with effects being more pronounced in Sample 1. Among mothers, higher overall stress was associated with softer speech and parental stress with sharper voice quality, whereas among fathers, stress-related associations differed across samples and acoustic measures. To facilitate interpretation of the pattern of findings across predictors, parent gender, and samples, Table 5 provides a summary of the significant associations between parental characteristics and acoustic features.

DISCUSSION

Parental communication, including the way parents speak to their children, plays a key role in children's development and the quality of the parent-child relationship (Collins et al., 2000; Hart et al., 2003). Yet, it remains unclear whether, and how, individual differences in parental characteristics are reflected in the vocal characteristics of parents' speech when addressing a child. The current study examined whether vocal features of parental speech are systematically related to individual differences in parental autonomy support, psychological control, authoritarianism, and perceived stress. To examine the robustness of these associations, we drew on two samples differing in language (Dutch vs. English) and in the ages of participants' children, whom they thought about while intoning phrases.

Our findings offer novel evidence that parents' vocal behavior in simulated parenting scenarios is associated with individual characteristics, although associations between parental characteristics and acoustic features were highly specific to the predictor, acoustic cue, parent gender, and samples. This pattern is consistent with the specificity principle (Bornstein,

2017), which suggests that psychological processes often operate in targeted rather than generalized ways, such that particular predictors relate to particular outcomes under particular conditions. One possible explanation is that parents flexibly adjust their vocal expressions to the demands of specific interactional contexts and children, such that different parental characteristics may become expressed through different vocal cues, even when parents exhibit similar motivational approaches.

Vocal Signatures of Psychological Control and Authoritarianism

Addressing Research Questions 1 and 2, psychological control and authoritarianism, but not autonomy support, were associated with parents' vocal characteristics across both samples. First, psychological control was associated with a harsher-sounding voice in mothers, suggesting that mothers who are more controlling in their general parenting approach also express this tendency vocally. This finding aligns with prior work indicating that voice quality, as reflected in a harsher-sounding voice, can function as a subtle yet salient signal of parental control (Paulmann et al., 2023; Vrijders et al., 2025; Weinstein et al., 2020). Such salient vocal cues may help explain why parent-child agreement is typically higher for psychological control than for autonomy support, which appears to rely on more diffuse and less perceptually salient cues (Korelitz & Garber, 2016; Vrolijk et al., 2023). The absence of a comparable association among fathers suggests that the vocal expression of psychological control may be more context- or role-dependent, distinction that warrants further investigation.

Second, both Dutch-speaking mothers and English-speaking fathers with more authoritarian attitudes tended to speak more slowly. In the English-speaking sample, there was also some indication that authoritarian attitudes were related to greater variation in speaking volume. These prosodic patterns, previously linked to dominant communication styles and perceptions of dominance (Hughes et al., 2014, Tusing & Dillard, 2000), may

reflect a heightened tendency to emphasize control or assertiveness consistent with authoritarian beliefs. The presence of these effects across two linguistic samples supports their generalizability and may reflect culturally common patterns in how control-related parental traits are vocally encoded, at least in Western nations.

Stress as a Situational and Context-Dependent Vocal Influence

No clear evidence emerged with respect to Research Question 3a and 3b, as effects of stress were less consistent. In Sample 1, both general and parental stress were associated with a range of prosodic changes, which even differed for mothers and fathers. No comparable within-sample associations were observed in Sample 2. This pattern aligns with prior work on emotional voices showing that stress can influence vocal production, but not in consistent or predictable ways (Paulmann et al., 2016). One explanation is that stress-related vocal cues may be more situational and context-dependent, reflecting short-term fluctuations rather than stable patterns of vocal expression (e.g., Giddens et al., 2013; Kreiman & Sidtis, 2011). As such, such effects may be harder to detect through general self-report measures and might require more context-sensitive or fine-grained approaches in future research.

Limitations and Future Directions

Despite several strengths, including the use of two independent samples that vary on cultural-linguistic and developmental characteristics, and the objective assessment of parents' vocal characteristics, some limitations should be noted. First, this study relied on simulated parenting scenarios, which offer experimental control but cannot fully capture the nuances and dynamics of naturalistic parent-child interactions, especially because children were not actually present. Parents in Sample 1 also rated the situations as only moderately realistic. In addition, the reliability of the autonomy support measure in Sample 2 was low (McDonald's $\omega = .62$), which may have attenuated some associations and should be considered when interpreting the results. Finally, we did not collect information on parents' ethnicity, which

limits our ability to examine whether observed associations might vary across different ethnic groups within the samples. At the same time, the two samples differed in linguistic context, and several associations differed across samples, suggesting that the observed patterns may depend on contextual factors.

Despite these limitations, we observed several associations between parental characteristics and vocal behavior, suggesting that certain parental traits may be reflected in specific aspects of how parents sound when interacting with their children. Future research could examine vocal patterns in real-life interactions or enhance scenario realism, for example, by presenting parents with a child's audio recording to foster greater immersion and ecological validity. Such work could further illuminate how vocal behavior functions as a subtle but powerful vehicle through which parental characteristics are expressed and experienced.

IMPLICATIONS FOR PRACTICE AND THEORY

Overall, the present findings highlight that how parents sound relates to what they want to communicate, and to their individual characteristics. In particular, parental control and authoritarianism manifested at the voice level, particularly among mothers. These findings advance the field's understanding of some complex and often subtle dynamics that influence the parent-child relationship. Theoretically, the results highlight the importance of incorporating vocal characteristics into models of parental communication. Although many of the effects were modest, they likely occur repeatedly in daily life, such that repeated exposure to vocal patterns reflecting tension, irritability, or control may shape how children perceive and respond to their parents over time (Bornstein, 2014). Practically, the results suggest that increasing parents' awareness of how they sound may represent a promising avenue for interventions aimed at fostering more supportive parent–child relationships. Considering relevant parental characteristics may help inform more tailored interventions aimed at

improving both parent and child well-being. For instance, stress-reduction interventions may be most effective when focused on momentary vocal outbursts, whereas parents with controlling or authoritarian tendencies may benefit more from broader interventions promoting autonomy-supportive communication.

AFFILIATIONS AND ADDRESSES

Berdien Vrijders, Ghent University, Henri Dunantlaan 2, 9000 Ghent, Belgium. Email: Berdien.vrijders@ugent.be. Maarten Vansteenkiste is at Ghent University, Netta Weinstein is at the University of Reading, and Silke Paulmann is at the University of Essex.

ARTICLE INFORMATION

Conflict of Interest Disclosures

Each author signed a form for disclosure of potential conflicts of interest. No authors reported any financial or other conflicts of interest in relation to the work described.

Ethical Principles

The authors affirm having followed professional ethical guidelines in preparing this work. These guidelines include obtaining informed consent from human participants, maintaining ethical treatment and respect for the rights of human or animal participants, and ensuring the privacy of participants and their data, such as ensuring that individual participants cannot be identified in reported results or from publicly available original or archival data. The study was conducted in accordance with the General Ethical Protocol of Ghent University.

Funding

This work was supported by Grant FWO.OPR.2021.003.701 from the Fund for Scientific Research – Flanders.

Role of the Funders/Sponsors

None of the funders or sponsors of this research played any role in the design and conduct of the study; collection, management, analysis, and interpretation of data; *Parenting Style Guide*

preparation, review, or approval of the manuscript; or decision to submit the manuscript for publication.

Acknowledgements

The authors thank Bart Soenens for his input on the experimental design of this study. The ideas and opinions expressed herein are those of the authors alone, and endorsement by the institutions the authors are affiliated with is not intended and should not be inferred.

Data Availability Statement

The data that support the findings of this study are openly available in ResearchBox at https://researchbox.org/4400.

Supplemental Data

Supplemental data for this article can be accessed online at [*URL to be filled in by Parenting Production Editor*].

Declaration of Generative AI in the Writing Process

During the preparation of this work the authors used ChatGPT to improve the readability of the manuscript. Afterward the authors reviewed and edited the content as needed and take full responsibility for the content of the published article.

REFERENCES

Adorno, T. W., Frenkel-Brunswik, E., Levinson, D., & Sanford, R. N. (1950). *The authoritarian personality.* Harper.

Altemeyer, B. (1983). *Right-wing authoritarianism*. University of Manitoba Press.

Barber, B. K. (1996). Parental psychological control: Revisiting a neglected construct. *Child Development*, *67*(6), 3296-3319. https://doi.org/10.1111/j.1467-8624.1996.tb01915.x

Barber, B. K., Stolz, H. E., Olsen, J. A., Collins, W. A., & Burchinal, M. (2005). Parental support, psychological control, and behavioral control: Assessing relevance across time, culture, and method. *Monographs of the Society for Research in Child*

Development, *70*(4, Serial No. 282), i-147. https://doi.org/10.1111/j.1540-5834.2005.00366.x

Baumrind, D. (1966). Effects of authoritative parental control on child behavior. *Child Development*, 887-907. https://doi.org/10.2307/1126611

Boersma, P., & Weenink, D. (2023). Praat: doing phonetics by computer [Computer program]. Version 6.3.14. *Retrieved August 2024*, *3*, 2024.

Bornstein, M. H. (2014). Human infancy … and the rest of the lifespan. *Annual Review of Psychology*, *65*, 121-158. https://doi.org/10.1146/annurev-psych-120710-100359

Bornstein, M. H. (2017). The specificity principle in acculturation science. *Perspectives on Psychological Science*, 12(1), 3–45. https://doi.org/10.1177/1745691616655997

Bradshaw, E. L., Duineveld, J. J., Conigrave, J. H., Steward, B. A., Ferber, K. A., Joussemet, M., Parker, P. D., & Ryan, R. M. (2025). Disentangling autonomy-supportive and psychologically controlling parenting: A meta-analysis of self-determination theory's dual process model across cultures. *American Psychologist, 80*(6), 879–895. https://doi.org/10.1037/amp0001389

Braun, S., Annovazzi, C., Botella, C., Bridler, R., Camussi, E., Delfino, J. P., Mohr, C., Moragrega, I., Papagno, C., & Pisoni, A. (2017). Assessing chronic stress, coping skills, and mood disorders through speech analysis: A self-assessment 'voice app' for laptops, tablets, and smartphones. *Psychopathology*, *49*(6), 406-419. https://doi.org/10.1159/000450959

Brenning, K., & Soenens, B. (2017). A self-determination theory perspective on postpartum depressive symptoms and early parenting behaviors. *Journal of Clinical Psychology*, *73*(12), 1729-1743. https://doi.org/10.1002/jclp.22480

Cohen, S., Kamarck, T., & Mermelstein, R. (1983). A global measure of perceived stress. *Journal of Health and Social Behavior*, *24*(4), 385–396. https://doi.org/10.2307/2136404

Collins, W. A., Maccoby, E. E., Steinberg, L., Hetherington, E. M., & Bornstein, M. H. (2000). Contemporary research on parenting: The case for nature and nurture. *American Psychologist, 55*(2), 218–232. https://doi.org/10.1037/0003-066X.55.2.218

Conger, R. D., Wallace, L. E., Sun, Y., Simons, R. L., McLoyd, V. C., & Brody, G. H. (2002). Economic pressure in African American families: a replication and extension of the family stress model. *Developmental Psychology*, *38*(2), 179-193. https://doi.org/10.1037/0012-1649.38.2.179

Deci, E. L., Ryan, R. M., & Guay, F. (2013). Self-determination theory and actualization of human potential. In D. M. McInerney, H. W. Marsh, R. G. Craven, & F. Guay (Eds.), *Theory driving research: New wave perspectives on self-processes and human development* (pp. 109–133). IAP Information Age Publishing.

Demenko, G., & Jastrzębska, M. (2012). Analysis of natural speech under stress. *Acta Physica Polonica A*, *121*(1A), A-92–A-96. https://doi.org/10.12693/APHYSPOLA.121.A-92

De Vries, J., & Drent, M. (2004). Relationship between perceived stress and sarcoidosis in a Dutch patient population. *Sarcoidosis, Vasculitis, and Diffuse Lung Diseases: Official Journal of WASOG*, *21*(1), 57-63. https://doi.org/10.36141/svdld.v21i1.6604

Duriez, B., & Soenens, B. (2009). The intergenerational transmission of racism: The role of right-wing authoritarianism and social dominance orientation. *Journal of Research in Personality*, *43*(5), 906-909. https://doi.org/10.1016/j.jrp.2009.05.014

Duriez, B., Soenens, B., & Vansteenkiste, M. (2007). In search of the antecedents of adolescent authoritarianism: The relative contribution of parental goal promotion and

parenting style dimensions. *European Journal of Personality*, *21*(4), 507-527. https://doi.org/10.1002/per.645

Giddens, C. L., Barron, K. W., Byrd-Craven, J., Clark, K. F., & Winter, A. S. (2013). Vocal indices of stress: a review. *Journal of Voice*, *27*(3), 321.e1–329.e1. https://doi.org/10.1016/j.jvoice.2012.09.007

Grolnick, W. S., Ryan, R. M., & Deci, E. L. (1991). Inner resources for school achievement: Motivational mediators of children's perceptions of their parents. *Journal of Educational Psychology*, *83*(4), 508-517. https://doi.org/10.1037/0022-0663.83.4.508

Haines, J. E., & Schutte, N. S. (2023). Parental conditional regard: A meta-analysis. *Journal of Adolescence*, *95*(2), 195-223. https://doi.org/10.1002/jad.12111

Hart, C. H., Newell, L. D., Olsen, S. F. (2003). Parenting skills and social/communicative competence in childhood. In J. O. Greene & B. R. Burleson (Eds.), *Handbook of communication and social interaction skill* (pp. 753-797). Lawrence Erlbaum Associates.

Hellbernd, N., & Sammler, D. (2016). Prosody conveys speaker's intentions: Acoustic cues for speech act perception. *Journal of memory and language*, *88*, 70-86. https://doi.org/10.1016/j.jml.2016.01.001

Heydari, A., Teymoori, A. and Haghish, E.F. (2013), SES, parental control, and authoritarianism. Asian Journal of Social Psychology, 16: 228-237. https://doi.org/10.1111/ajsp.12027

Hughes, S. M., Mogilski, J. K., & Harrison, M. A. (2014). The perception and parameters of intentional voice manipulation. *Journal of Nonverbal Behavior*, *38*(1), 107-127. https://doi.org/10.1007/s10919-013-0163-z

Kappen, M., van der Donckt, J., Vanhollebeke, G., Allaert, J., Degraeve, V., Madhu, N., Van Hoecke, S., & Vanderhasselt, M.-A. (2022). Acoustic speech features in social

comparison: How stress impacts the way you sound. *Scientific Reports, 12*, 22022. https://doi.org/10.1038/s41598-022-26375-9

Kirchhübel, C., Howard, D. M., & Stedmon, A. W. (2011). Acoustic correlates of speech when under stress: Research, methods and future directions. *The International Journal of Speech, Language and the Law*, *18*(1), 75-98. https://doi.org/10.1558/ijsll.v18i1.75

Klofstad, C. A., Anderson, R. C., & Peters, S. (2012). Sounds like a winner: Voice pitch influences perception of leadership capacity in both men and women. *Proceedings of the Royal Society B: Biological Sciences*, *279*(1738), 2698-2704. https://doi.org/10.1098/rspb.2012.0311

Ko, S. J., Sadler, M. S., & Galinsky, A. D. (2015). The sound of power: Conveying and detecting hierarchical rank through voice. *Psychological Science*, *26*(1), 3-14. https://doi.org/10.1177/0956797614553009

Korelitz, K. E., & Garber, J. (2016). Congruence of parents' and children's perceptions of parenting: A meta-analysis. *Journal of Youth and Adolescence*, *45*(10), 1973-1995. https://doi.org/10.1007/s10964-016-0524-0

Kreiman, J., & Sidtis, D. (2011). *Foundations of voice studies: An interdisciplinary approach to voice production and perception*. John Wiley & Sons.

Laurin, J. C., Joussemet, M., Tremblay, R. E., & Boivin, M. (2015). Early forms of controlling parenting and the development of childhood anxiety. *Journal of Child and Family Studies*, *24*(11), 3279-3292. https://doi.org/10.1007/s10826-015-0131-9

Mabbe, E., Soenens, B., Lagana, C., Costa, S., and Vansteenkiste, M., &. (Manuscript in preparation). *A new approach to examine the interplay between autonomy support and structure in parenting preschoolers: The situations with preschoolers questionnaire.*

Mageau, G A., & Joussemet, M. (2023). Autonomy-supportive behaviors: Common features and variability across socialization domains. In R. M. Ryan (Ed.), *The Oxford*

handbook of self-determination theory (pp. 509–528). Oxford University Press. https://doi.org/10.1093/oxfordhb/9780197600047.013.27

Murray, I. R., & Arnott, J. L. (1993). Toward the simulation of emotion in synthetic speech: A review of the literature on human vocal emotion. *The Journal of the Acoustical Society of America*, *93*(2), 1097-1108. https://doi.org/10.1121/1.405558

Parke, R. D., & Cookston, J. T. (2019). Fathers and families. In *Handbook of parenting* (pp. 64-136). Routledge. https://doi.org/10.4324/9780429433214-3

Paulmann, S., Furnes, D., Bøkenes, A. M., & Cozzolino, P. J. (2016). How psychological stress affects emotional prosody. *PLoS ONE, 11*(11), e0165022. https://doi.org/10.1371/journal.pone.0165022

Paulmann, S., & Weinstein, N. (2023). Teachers' motivational prosody: A pre-registered experimental test of children's reactions to tone of voice used by teachers. *British Journal of Educational Psychology*, *93*(2), 437-452. https://doi.org/10.1111/bjep.12567

Peer, E., Brandimarte, L., Samat, S., & Acquisti, A. (2017). Beyond the Turk: Alternative platforms for crowdsourcing behavioral research. *Journal of Experimental Social Psychology*, *70*, 153-163. https://doi.org/10.1016/j.jesp.2017.01.006

Puts, D. A., Gaulin, S. J., & Verdolini, K. (2006). Dominance and the evolution of sexual dimorphism in human voice pitch. *Evolution and Human Behavior*, *27*(4), 283-296. https://doi.org/10.1016/j.evolhumbehav.2005.11.003

Reeve, J., Jang, H. R., & Jang, H. (2018). Personality-based antecedents of teachers' autonomy-supportive and controlling motivating styles. *Learning and Individual Differences*, *62*, 12-22. https://doi.org/10.1016/j.lindif.2018.01.001

R Core Team. (2021). *R: A language and environment for statistical computing.* [Computer software]. R Foundation for Statistical Computing. https://www.R-project.org/

Ryan, R. M., & Deci, E. L. (2017). *Self-determination theory: Basic psychological needs in motivation, development, and wellness*. Guilford publications.

Scherer, K. R., London, H., & Wolf, J. J. (1973). The voice of confidence: Paralinguistic cues and audience evaluation. *Journal of Research in Personality*, *7*(1), 31-44. https://doi.org/10.1016/0092-6566(73)90030-5

Smetana, J. G. (2006). Social-cognitive domain theory: Consistencies and variations in children's moral and social judgments. In M. Killen & J. Smetana (Eds.), *Handbook of moral development* (Vol. 2, pp. 119-153). Routledge.

Soenens, B., Deci, E. L., & Vansteenkiste, M. (2017). How parents contribute to children's psychological health: The critical role of psychological need support. In *Development of self-determination through the life-course* (pp. 171-187). Springer. https://doi.org/10.1007/978-3-319-65003-5_12

Soenens, B., Luyckx, K., Vansteenkiste, M., Luyten, P., Duriez, B., & Goossens, L. (2008). Maladaptive perfectionism as an intervening variable between psychological control and adolescent depressive symptoms: A three-wave longitudinal study. *Journal of Family Psychology, 22*(3), 465–474. https://doi.org/10.1037/0893-3200.22.3.465

Soenens, B., & Vansteenkiste, M. (2010). A theoretical upgrade of the concept of parental psychological control: Proposing new insights on the basis of self-determination theory. *Developmental Review*, *30*(1), 74-99. https://doi.org/10.1016/j.dr.2009.11.001

Sondhi, S., Khan, M., Vijay, R., & Salhan, A. K. (2015). Vocal indicators of emotional stress. *International Journal of Computer Applications*, *122*(15), 38-43. https://doi.org/10.5120/ijca2015906765

Soykan, A., Gardner, D., & Edwards, T. (2019). Subjective wellbeing in New Zealand teachers: An examination of the role of psychological capital. *Journal of Psychologists and Counsellors in Schools*, *29*(2), 130-138. https://doi.org/10.1017/jgc.2019.14

Turiel, E. (1989). Domain-specific social judgments and domain ambiguities. *Merrill-Palmer Quarterly, 35*(1), 89–114. https://www.jstor.org/stable/23086426

Tusing, K. J., & Dillard, J. P. (2000). The sounds of dominance. Vocal precursors of perceived dominance during interpersonal influence. *Human Communication Research*, *26*(1), 148-171. https://doi.org/10.1111/j.1468-2958.2000.tb00754.x

Van Der Kaap-Deeder, J., Soenens, B., Mabbe, E., Dieleman, L., Mouratidis, A., Campbell, R., & Vansteenkiste, M. (2019). From daily need experiences to autonomy-supportive and psychologically controlling parenting via psychological availability and stress. *Parenting*, *19*(3), 177-202. https://doi.org/10.1080/15295192.2019.1615791

Van Lierde, K., Van Heule, S., De Ley, S., Mertens, E., & Claeys, S. (2009). Effect of psychological stress on female vocal quality: A multiparameter approach. *Folia Phoniatrica et Logopaedica*, *61*(2), 105-111. https://doi.org/10.1159/000209273

Vasquez, A. C., Patall, E. A., Fong, C. J., Corrigan, A. S., & Pine, L. (2016). Parent autonomy support, academic achievement, and psychosocial functioning: A meta-analysis of research. *Educational Psychology Review*, *28*(3), 605-644. https://doi.org/10.1007/s10648-015-9329-z

Vrolijk, P., Van Lissa, C. J., Branje, S., & Keizer, R. (2023). Longitudinal linkages between parent-child discrepancies in reports on parental autonomy support and informants' depressive symptoms. *Journal of Youth and Adolescence*, *52*(4), 899-912. https://doi.org/10.1007/s10964-022-01733-y

Vrijders, B., Vansteenkiste, M., Weinstein, N., Paulmann, S., & Soenens, B. (Manuscript under review). *Do preschoolers respond differently to autonomy-supportive and controlling prosody?*

Vrijders, B., Weinstein, N., Paulmann, S., Soenens, B., Waterschoot, J., & Vansteenkiste, M. (2025). Your prosody matters! The effect of controlling tone of voice on listeners'

experienced pressure, closeness, and intention to collaborate with the speaker. *Motivation Science, 11*(1), 49–66. https://doi.org/10.1037/mot0000357

Weinstein, N., Vansteenkiste, M., & Paulmann, S. (2020). Don't you say it that way! Experimental evidence that controlling voices elicit defiance. *Journal of Experimental Social Psychology*, *88*, 103949. https://doi.org/10.1016/j.jesp.2019.103949

Weinstein, N., Zougkou, K., & Paulmann, S. (2018). You 'have'to hear this: Using tone of voice to motivate others. *Journal of Experimental Psychology: Human Perception and Performance*, *44*(6), 898-913. https://doi.org/10.1037/xhp0000502

Zimmer-Gembeck, M. J., Webb, H. J., Thomas, R., & Klag, S. (2015). A new measure of toddler parenting practices and associations with attachment and mothers' sensitivity, competence, and enjoyment of parenting. *Early Child Development and Care*, *185*(9), 1422-1436. https://doi.org/10.1080/03004430.2014.1001753

Table 1. Main effects of sociodemographic variables on acoustic features in Sample 1.

	Pitch		Amplitude		Voice Quality		Speech Rate[a]	
	β	*t*	β	*t*	β	*t*	β	*t*
Parent Age	-.05*	-2.60	-.04	-1.59	-.02	-.83	.12***	6.36
Gender (father)	-.75***	-42.27	.06*	2.13	-.03	-1.06	-.18***	-9.87
Relationship status (single)	.05*	2.73	.06	1.85	.07*	2.06	-.02	-1.28
Education (higher)	.04*	2.38	.04	1.39	-.10***	-3.22	-.06***	-3.60
Children (two)	.07*	2.69	.07	1.66	.03	.64	.01	.19
Children (> two)	.13***	5.22	-.03	-.71	.11*	2.68	.05*	2.03

Note. Reference categories: gender = mother; relationship status = partnered; education = lower; number of children = one child. Parent age is continuous.

[a] Speech rate was operationalized as the total duration (in s) of the spoken segment; longer duration indicates slower speech.

*$p < .05$. **$p < .01$. ***$p < .001$.

Table 2. Descriptive statistics and between-person Pearson correlations for mothers (above the diagonal) and fathers (below the diagonal) for Sample 1.

	Mothers *M (SD)*	Fathers *M (SD)*	1.	2.	3.	4.	5.	6.	7.	8.	9.
1. Psychological control	1.86 (0.51)	1.96 (0.54)		-.06	.09	.44***	.40***	.13*	.16***	.11*	.09
2. Autonomy-support	4.58 (0.39)	4.41 (0.48)	-.62***		-.28***	-.06	-.28***	-.06	-.11*	.04	-.11*
3. Authoritarianism	2.48 (0.54)	2.71 (0.55)	.30***	-.40***		-.12*	-.10*	.19***	.12*	.08	.23***
4. General stress	2.54 (0.56)	2.31 (0.50)	.47***	-.50***	.25***		.49***	.00	.02	-.02	.01
5. Parental stress	2.02 (0.81)	2.10 (0.78)	.32***	-.33***	.17***	.62***		.12*	.02	.05	.03
6. Voice quality	23.55 (7.27)	23.15 (7.57)	.09	-.08	.13**	.10	.07		-.07	.25***	.18***
7. Amplitude (*SD*)	10.86 (3.20)	11.16 (3.55)	.08	-.08	-.03	.17***	.26***	-.02		.05	.33***
8. Pitch	193.12 (24.18)	132.03 (24.84)	-.06	.08	-.05	-.04	.06	.24***	.07		-.08
9. Speech rate[a]	1.31(0.34)	1.21 (0.32)	.10	.03	.01	-.04	.06	.05	.39***	.03	

Note. [a]Speech rate was operationalized as the total duration (in s, *Range* = 0.43-3.29) of the spoken segment; longer duration indicates slower speech.

*$p < .05$. **$p < .01$. ***$p < .001$.

Table 3. Descriptive statistics and between-person Pearson correlations for mothers (above the diagonal) and fathers (below the diagonal) for Sample 2.

	Mothers *M (SD)*	Fathers *M (SD)*	1.	2.	3.	4.	5.	6.	7.	8.	9.
1. Psychological control	1.97 (0.60)	2.06 (0.57)		-.35***	-.08	.45***	.40***	.29*	-.03	.24*	-.07
2. Autonomy-support	4.08 (0.40)	4.16 (0.36)	-.38***		-08	-.18	-.23*	-.18	-.05	-.01	.16
3. Authoritarianism	3.01 (0.59)	2.72 (0.57)	.12	.01		.00	-04	-.06	.23	-.11	.20
4. General stress	2.87 (0.67)	2.55 (0.52)	.21	-.24	-.04		.51***	-.13	.-05	-.04	.11
5. Parental stress	2.17 (0.95)	1.85 (0.73)	.36***	-.28*	.17	.49***		.01	-.04	-.05	-.03
6. Voice quality	24.44 (6.98)	25.54 (6.41)	.12	.01	-.21	.12	.07		-.09	.42***	.07
7. Amplitude (*SD*)	11.32 (2.96)	11.02 (2.94)	-.26*	.14	.30*	-.22	-.46***	.05		-.13	.34***
8. Pitch	214.24 (33.44)	136.90 (28.59)	-.11	.06	.08	-.14	-.07	.13	.00		.14
9. Speech rate[a]	1.86 (0.56)	1.72 (0.51)	-.05	-.06	.29*	.04	-.16	-.03	.44***	-.04	

Note. Correlations for fathers are presented below the diagonal; correlations for mothers are presented above the diagonal.

[a]Speech rate was operationalized as the total duration (in s, *Range* = 0.78-4.59) of the spoken segment; longer duration indicates slower speech.

*$p < .05$. **$p < .01$. ***$p < .001$.

Table 4. Results of linear mixed effects models among mothers and fathers for Samples 1 and 2.

	Pitch								Amplitude							
	Mothers				Fathers				Mothers				Fathers			
	Sample 1		Sample 2		Sample 1		Sample 2		Sample 1		Sample 2		Sample 1		Sample 2	
	β	*t*	B	*T*	B	*t*	B	*t*	β	*t*	β	*t*	β	*t*	β	*t*
Psychological control	.04	1.05	.26*	2.61	-.01	-.15	-.08	-.65	.15***	3.41	.00	.03	.00	.03	-.09	-1.20
Autonomy support	.08*	2.13	.04	.41	.06	1.02	.00	-.03	-.09*	-2.34	.00	-.04	-.02	-.31	.01	.15
Authoritarianism	.12***	3.17	-.08	-.89	-.05	-1.06	.09	.77	.03	.81	.15	2.00	-.07	-1.50	.15*	2.16
General stress	-.02	-.44	-.09	-.88	-.08	-1.44	-.19	-1.45	-.03	-.74	-.02	-.20	.01	.20	-.04	-.47
Parental stress	.05	1.10	-.09	-.89	.13*	2.49	.11	.78	-.07	-1.59	-.02	-.19	.20***	4.03	-.20*	-2.38
	Voice Quality								Speech Rate[a]							
	Mothers				Fathers				Mothers				Fathers			
	Sample 1		Sample 2		Sample 1		Sample 2		Sample 1		Sample 2		Sample 1		Sample 2	
	β	*t*	β	*T*	β	*t*	B	*t*	β	*t*	β	*t*	β	*t*	β	*t*
Psychological control	.12*	2.51	.29*	2.86	.07	1.27	.16	1.40	.06	1.94	-.02	-.35	.09*	2.75	-.04	-.45
Autonomy support	.02	.38	-.09	-.89	.05	.83	.05	.43	-.02	-.66	.09	1.44	.08*	2.24	-.04	-.46
Authoritarianism	.11*	2.47	-.02	-.22	.07	1.53	-.20	-1.94	.08*	2.82	.11	1.86	.-.02	-.78	.16*	2.18
General stress	-.10*	-2.13	-.23*	-2.14	.04	.61	.07	.66	-.03	-1.03	.11	1.48	-.08*	-2.21	.05	.69
Parental stress	.12*	2.50	-.01	-.13	.02	.37	-.04	-.36	.02	.85	-.04	-.60	.12***	3.81	-.10	-1.22

Note. [a]Speech rate was operationalized as the total duration (in seconds) of the spoken segment; longer duration indicates slower speech.

*$p < .05$. **$p < .01$. ***$p < .001$.

Table 5. Summary of associations between parental characteristics and acoustic features of speech for mothers and fathers.

	Psychological Control		Autonomy Support		Authoritarianism		General Stress		Parental stress	
Acoustic Cues	Mothers	Fathers	Mothers	Fathers	Mothers	Fathers	Mothers	Fathers	Mothers	Fathers
Pitch	↑ (2)		↑ (1)		↑ (1)					↑ (1)
Amplitude	↑ (1)		↓ (1)		↑ (2)	↑ (2)				↑ (1), ↓ (2)
Voice quality	↑ (1, 2)				↑ (1)		↓ (1, 2)		↑ (1)	
Speech rate	↑ (1)	↑ (1)		↑ (1)	↑ (1)	↑ (2)		↓ (1)		↑ (1)

Note. Cells indicate significant associations. ↑ = positive association; ↓ = negative association; 1 = Sample 1; 2 = Sample 2. When directions differ across samples, both effects are reported.