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Cleaning up toys, playing games with peers, learning to get dressed, or being careful when entering a potentially dangerous situation (e.g., crossing the street): preschoolers face many situations in which parents, as socializing agents, encourage them to carry out certain activities in a specific manner. During the preschool period, parents indeed frequently make requests, encouraging and motivating their children to engage and persevere in tasks, and acquire new skills (Grolnick et al., 2019; Laurin & Joussemet, 2017). At the same time, preschoolers increasingly assert their independence and more often take initiatives to organize their own activities (Erikson, 1950). Their striving for more independence may conflict with parental requests, with preschoolers more frequently challenging parental authority (Kochanska & Aksan, 1995). Particularly during this developmental period, the way parents communicate about requests is important to avoid power battles and to reconcile parental goals with children's need for independence (Verhoeven et al., 2019).

Parents vary considerably in the way they communicate with their preschool children (Andreadakis et al., 2019; Kelley et al., 2000; Ryan & Deci, 2017), with parents being more autonomy-supportive in some situations and more controlling or pressuring in others (Grolnick et al., 1997; Joussemet et al., 2008; Soenens et al., 2017). Among other factors, children's behavior is an important predictor of these variations in parental communication. Preschoolers are still in the early phases of developing the capacity to regulate behavior, thereby frequently displaying noncompliant behaviors and disobeying parental requests (Brehm, 1981; Kuczynski et al., 1987). Whereas less compliant behaviors can elicit more controlling parental communication, preschoolers' cooperative behaviors may be met with more parental autonomy support (Grolnick & Apostoleris, 2002).

These distinct motivational approaches manifest not only in the content of parents' messages but also in the tone of voice parents use when addressing their child (Weinstein et al., 2019, 2020). For instance, parents may approach their children with a smooth, calm voice when relaxed or during play, while they may use a sharper or forceful voice when under some sort of pressure themselves (e.g., getting the child ready for school in time) or when making repeated requests without getting the desired response (e.g., asking to clean up toys repeatedly). Few studies to date examined whether preschoolers, at their young age, respond differently (in terms of emotions and behaviors) to autonomy-supportive and controlling tones of voice. Across two independent samples, the current research therefore addressed two gaps in the literature. First, using a puppet interview protocol, we investigated whether preschoolers would attribute different degrees of anger, fear, pressure, choice, closeness to, and intent to collaborate in a child puppet in response to actor-recorded autonomy-supportive and controlling prosody.

Second, we explored whether preschoolers' evaluations of motivational prosody would vary as a function of characteristics of the child (i.e., child temperament), the parent-child relationship (i.e., general parenting style of child's parent), the topic of the parent-child interaction (i.e., social domain) and the semantic content (i.e., words) of the parental message. In this way, we aimed to address the robustness and generalizability of the effects of motivational prosody.

Autonomy-supportive and Controlling Parenting

Self-Determination Theory (SDT; Ryan & Deci, 2017; Ryan et al., 2021) differentiates between autonomy-supportive and controlling communication as two distinct ways in which parents can motivate their children (Grolnick et al., 1997; Joussemet et al., 2008; Soenens et al., 2017). When autonomy-supportive, parents support their children's basic psychological need for autonomy (i.e., the feeling of volition, willingness and choice when carrying out an activity) by taking their child's perspective and using practices such as providing meaningful

choices, giving a developmentally appropriate rationale when introducing rules and describing problems in an informational and descriptive way. Moreover, they follow the rhythm of their child during activities and they show and communicate empathy and respect for children's ideas and feelings, even when the child's opinion deviates from the parents' viewpoint (Grolnick et al., 1997; Soenens et al., 2017). In contrast, when controlling, parents thwart their children's basic need for autonomy, by pressuring them to think, feel, or behave a certain way. Controlling parenting practices include both more overt controlling strategies such as yelling, punishing and insulting, as well as more covert, psychologically controlling techniques like conditional love, guilt induction and intrusion (Barber, 1996; Ryan & Deci, 2017; Soenens & Vansteenkiste, 2010).

Autonomy-supportive parenting is assumed to be beneficial for psychosocial adjustment from early childhood into emerging adulthood, yet to play a particularly pronounced role in periods marked by developmental tasks dealing with autonomy, such as the preschool years (Soenens & Vansteenkiste, 2023). Research has indeed shown that autonomy-supportive parenting is related to a host of positive outcomes in preschool children. Parental autonomy support, as observed during a parent-child interaction task, related positively to preschoolers' executive functioning (Distefano et al., 2018; 2024), cooperation levels (Molitor et al., 2024), conversation engagement (Van der Kaap-Deeder et al., 2020), self-regulatory abilities (Bernier et al., 2010), and higher attachment security (Bernier et al., 2015). Similar results have been found using experimental (Meuwissen & Carlson, 2019) and longitudinal methods (Regueiro et al., 2020). Moreover, parental autonomy support during a clean-up and toy prohibition task fostered preschoolers' rule internalization, as measured by their observed committed compliance during the tasks (Laurin & Joussemet, 2017). In contrast, controlling parenting has been shown to have negative effects on children's behavior and well-being. It has been found to increase both the risk for externalizing problem behaviors, such as physical aggression and

misconduct among preschoolers (Guldeste et al., 2024; Han & Lee, 2018) as well as internalizing problems behaviors like child anxiety (Guldeste et al., 2024; Laurin et al., 2015).

Autonomy-supportive and Controlling Tone of Voice

Parents' communication style manifests both in the semantics (or words used by parents) as well as the prosody (or the tone of voice) used by parents (Vrijders et al., 2024). However, few studies have addressed parents' prosody in the preschool years. With regards to the semantics of a motivational message, it was shown that maternal controlling instructions (i.e., instructions that pressure the child to perform particular behaviors) during a mother-child play task with 6–7-year-old children were associated with lower intrinsic motivation for the task (Deci et al., 1993). Similarly, experimental research outside the parenting context and across different developmental periods, showed that the use of controlling words (e.g., “You must”; “Do as I say!”, “You should know better by now”, etc.) was associated with reduced intrinsic motivation (Ryan, 1982) as well as lower conceptual learning (Grolnick & Ryan, 1987; Vansteenkiste et al., 2005), whereas autonomy-supportive wording (e.g., “I propose”, “I notice”, “Do you want to X?”) predicted greater autonomy need satisfaction (Baten et al., 2020), positive affect and motor skills learning (Hooyman et al., 2014) and perseverance (De Muynck et al., 2017).

In addition to semantics, a speaker's tone of voice, or prosody, may also affect listeners' perception of controlling or more autonomy-supportive communication (Weinstein et al., 2019, 2020). While a controlling tone of voice is mainly characterized by its harsh sound, an autonomy-supportive tone of voice is mostly defined by its smooth, gentle nature, or at least by a lack of harshness (Vrijders et al., 2024). Research with adolescents and adults has shown that motivational tone of voice has unique effects on listeners, with autonomy-supportive tone of voice predicting more positive and less negative affect, increased closeness and more cooperation and effort in adolescents (Paulmann & Weinstein, 2023). In contrast, controlling

tone of voice has been associated with more defiance against parental authority in adolescents (Weinstein et al., 2020), and with less intent to collaborate with speakers in adults (Vrijders et al., 2024).

To date, no studies have examined how preschoolers evaluate controlling and autonomy-supportive prosody, as most existing work has focused on adolescents and adults. Initial evidence showing that young children are indeed sensitive to different types of prosody was provided in a study among preverbal infants between 9 and 12 months old (Gerson et al., 2019). Infants were presented with phrases spoken in autonomy-supportive and controlling ways by day-care staff members, and were found to attend longer to controlling, when compared to autonomy-supportive, tone of voice. However, this study did not examine effects on other outcomes such as children's well-being, their connectedness to the adult, or compliance with the adult's request.

The lack of research on motivational prosody in the preschool years is remarkable because this developmental period is marked by an important shift in adult-to-child communication. The use of infant-directed speech (IDS), or "motherese," which features exaggerated intonation and rhythm to regulate infants' attention and convey affect (Fernald, 1993), gradually wanes by the preschool years (approximately ages 3 to 5), with most parents shifting towards more adult-like speech (Saint-Georges et al., 2013). This developmental transition coincides with children's tendency to assert more strongly their independence, making motivational interactions between parents and children both more frequent and more complex (Grolnick et al., 2019). Although motivational tone of voice may play an increasingly important role in children's emotions and behavior during this period, it remains unclear to what extent preschool-aged children are sensitive to the interpersonal implications of prosodic cues expressing control versus autonomy support. Given that preschoolers begin to show diverse responses to adult requests – including compliance, negotiation, and resistance (Brehm,

1981; Kuczynski et al., 1987) – understanding how they interpret motivational tone of voice may be particularly relevant during this developmental window.

The Present Research

The main aim of the current experimental research was to examine how preschoolers respond to motivational prosody. First, we explored whether preschoolers evaluated controlling and autonomy supportive tone of voice differently (Research Question 1). Secondly, we tested whether such evaluations may be altered by various factors, including child and parent characteristics, the social domain of the interaction and the semantic content of the message (Research Question 2-5). While Research Question 1 constitutes the primary aim of this study, Research Questions 2-5 are subsidiary and exploratory in nature, aimed at examining the robustness and boundary conditions of the main effect.

These research questions were examined across two samples. Preschoolers were presented with a number of actor-recorded sentences that were semantically identical but spoken in either an autonomy-supportive or controlling tone of voice. Using a puppet interview protocol, with the puppets representing parent and child figures, children indicated how they evaluated these recordings by reporting levels of felt pressure, felt choice, fear, anger, intent to collaborate and felt closeness in both samples. Sample 1 served as the primary study, while Sample 2 was designed as a replication and extension, additionally including a facial-expression measure in which children mimicked the child puppet's emotional reactions to capture emotional evaluations more objectively.

We hypothesized that stimuli expressed with a controlling tone of voice would be evaluated as more pressuring, less supportive of choice and would be associated with higher attributions of anger and fear, lower attributed intent to collaborate and felt closeness than stimuli expressed with autonomy-supportive tone of voice (Research Question 1). Because the perception of a parental request may depend on various factors, we investigated in a more

exploratory fashion whether these attributed effects of prosody would vary as a function of the child's temperament and the parenting style the child typically experiences (in both samples), as well as features of the request itself, namely the social domain (Sample 1) and the wording of the message (Sample 2). Given the limited and inconsistent evidence regarding such moderators in early childhood, no directional hypotheses were formulated for this aim. The main goal was to address the robustness of the hypothesized effects of prosody.

As for children's temperament, following differential susceptibility theory, we reasoned that individual differences in children's dispositional characteristics may shape how they interpret and evaluate parental communication (Belsky et al., 2007; Ellis & Boyce, 2011). In the present study, temperament was assessed in terms of three key dimensions: effortful control, negative affectivity, and surgency/extraversion. Given the lack of previous research on the interplay between temperament and prosody in early childhood, we explored whether any of these dimensions would be associated with variability in how preschoolers evaluated autonomy-supportive and controlling tones of voice (Research Question 2).

As for parenting style, two theoretical perspectives informed our exploratory approach. The sensitization perspective on basic psychological needs (Moller et al., 2010) suggests that children growing up in a generally need-supportive context may benefit more from new need-satisfying experiences, while those in need-thwarting contexts may be more sensitive to controlling events. Alternatively, contrast perspectives suggest that mismatches between habitual and situational parenting may have particularly pronounced effects (Gurland et al., 2012; Radel et al., 2011). Given these alternative perspectives, we explored whether general parenting style affects the way children evaluate autonomy-supportive and controlling tones of voice (Research Question 3).

Finally, two features of the parental request itself may shape preschoolers' responses. First, the social domain of the request may play a role, as controlling communications may be

appraised differently depending on whether they pertain to the moral domain (e.g., taking a snack from another child), the prudential domain (e.g., eating a cookie instead of fruit), or personal matters (e.g., wearing gel in one's hair; Smetana, 2006; Turiel, 2015; Van Petegem et al., 2017). Accordingly, in Sample 1, we explored whether the role of motivational prosody differed across these domains (Research Question 4). Second, drawing on theoretical accounts suggesting that tone of voice and semantic content jointly shape interpersonal meaning (Reeve & Tseng, 2011; Vrijders et al., 2024), in Sample 2, we explored whether prosody effects would be stronger when tone and wording were congruent (Research Question 5).

Method

Participants

In total, 305 native Dutch-speaking parent–child dyads participated across two samples (Sample 1: $N = 189$, collected November 2022; Sample 2: $N = 116$, collected November 2024). In Sample 1, children were 4 (34.9%), 5 (37.6%), or 6 years old (27.5%), and 60% were female. In Sample 2, children were 4 (40.8%), 5 (41.2%), or 6 years old (18.0%), and 60.3% were female. Across both samples, 148 participating parents (48.5%) were fathers and 157 (51.5%) were mothers. Parents in Sample 1 had a mean age of 36.73 years ($SD = 13.62$; $Range = 26–58$), whereas parents in Sample 2 had a mean age of 37.52 years ($SD = 5.03$; $Range = 26–59$). Parents reported having on average 2.17 children in Sample 1 and 2.18 children in Sample 2. In both samples, the majority of parents held a college or university degree (Sample 1: 74.1%; Sample 2: 75.4%) and were married or cohabiting (Sample 1: 90.4%; Sample 2: 98.3%). All participating parents are considered primary caregivers of the participating children.

To evaluate whether the sample sizes were sufficient to detect effects of interest, post hoc sensitivity power analyses were conducted using G*Power (Faul et al., 2007). Assuming conventional values for power (.80) and alpha (.05), and using the most conservative estimate for correlated measurements ($r = .23$), Sample 1 provided sufficient power to detect small-to-

medium effects ($f \geq .13$), while Sample 2 was powered to detect effects of small-to-medium magnitude ($f \geq .16$). Because the primary analyses relied on multilevel modeling, which typically offers greater statistical power than repeated-measures ANOVA (Quené & Van den Bergh, 2004), the present samples were deemed adequate to detect effects of comparable size.

Procedure

Data Collection

Data were collected as part of a course of developmental psychology at [blinded for review]. Each student recruited and visited one unacquainted parent-child dyad at home and was extensively trained to follow a standardized protocol. To ensure a balanced representation of parental gender, approximately half of the students were instructed to recruit a mother-child dyad and the other half a father-child dyad. Students were blind to the study aims and hypotheses in Sample 1, but not in Sample 2. To assess feasibility and potential fatigue effects, a pilot test was conducted with two independent 5-year-old participants prior to Sample 1 data collection. To further reduce cognitive load, the protocol was shortened for Sample 2: preschoolers listened to longer audio excerpts but provided fewer ratings. During the child data collection, parents were asked to fill in questionnaires in a separate room. Parents provided informed consent for themselves and their child. The study was approved by the ethical review board from [blinded for review].

Study Protocol

Phase 1. An age-appropriate protocol was developed to measure preschoolers' experiences (see Figure 1 for a visual depiction). Inspired by attachment research (Measelle & Ablow, 2017), puppets were used to help children better empathize with the situation. To ease initial interactions, the child and researcher collaboratively crafted two puppets. Girls were instructed to fold and color a girl puppet called Emma, while boys folded and colored a boy called Tuur, both common names among Dutch-speaking children. Simultaneously, the

researcher folded a larger parent puppet, which represented either a mother or a father (counterbalanced across participants). During this process, the researcher explained to the child that the puppets represented Emma or Tuur and their parent.

Phase 2. Once the child was acquainted with the puppets, the researcher explained the goal of the experiment through a trial round. The child was told that they would hear a story about Emma / Tuur and their parent, and that they would be asked to reenact the story using the puppets (e.g., “Emma/Tuur is playing. Mummy/Daddy of Emma/Tuur is coming and wants Tuur/Emma to leave the toys because it is dinner time. Now listen to what Mummy/Daddy says to Emma/Tuur”). The child then listened to a neutral audio excerpt twice (i.e., “It’s dinner time, so you can put your toys away.”) and was subsequently asked to indicate, for all outcome measures, how the child puppet would feel when spoken to by the parent puppet.

Phase 3. After the trial round, preschoolers listened to a short story in which a parent puppet addressed the child puppet about a behavior. In Sample 1, the stories depicted one of three domains (moral, prudential, or personal; Smetana, 2006). In the moral scenario, the parent observed the child taking a snack from another child. In the prudential scenario, the parent observed the child eating a cookie instead of a piece of fruit. In the personal scenario, the parent observed the child applying hair gel before school. These scenarios were rated as credible by an independent sample of parents ($M = 4.66$ for moral, $M = 3.66$ for prudential, $M = 3.50$ for personal). In Sample 2, the story depicted a single situation in which the child puppet misbehaved (drawing on the wall).

Following the story, preschoolers listened to actor-expressed sentences as if spoken by the parent puppet (see Vrijders et al., 2024 for full details on sentence development). In both samples, the tone of voice (controlling vs. autonomy-supportive) served as a within-person manipulation, with order being counterbalanced across phases 3 and 5. In Sample 2, the semantic content of the message (controlling vs. autonomy-supportive) was additionally

manipulated between participants. Children were randomly assigned to hear either a male or female actor in both samples.

In Sample 1, six sentences were presented of which three domain-general (e.g., “I don’t like you doing that”) and three domain-specific (tailored to the story): moral (‘Let’s give his snack back’), prudential (‘A piece of fruit is tasty too’) or personal (‘Now we have to wash your hair; see Appendix A, Table A1 for the full set of sentences). After each sentence, preschoolers indicated how the child puppet would feel across six outcomes, resulting in six ratings per sentence. In Sample 2, children indicated how the child puppet would feel once per audio excerpt. Acoustic properties of the recordings are reported in Appendix B, Table B1, and full transcripts of the stimuli are provided in Appendix A, Table A2.

Phase 4. The researcher and child then took a five-minute break together. The child was given a coloring sheet to relax and prevent concentration loss or frustration.

Phase 5. After the break, the researcher repeated the same story for the child (e.g., “Remember what Emma/Tuur did before? Can you reenact it again?”). The child then listened to the same excerpts as in phase 3, this time spoken in the opposite tone of voice from before the break (i.e., controlling if they had previously heard autonomy-supportive, and vice versa).

Measures

Child-reported Measures

After each sentence, preschoolers were asked to indicate how Emma/Tuur would feel if Emma’s/Tuur’s mummy/daddy spoke to them in that way. Responses were recorded using a child-appropriate rating scale with four emojis ranging from red (1) to green (4), mirroring the way the puppet would feel (see Figure 2A for rating scale; all character names and parental references were adapted to match the participating parent, i.e., ‘mummy’ or ‘daddy’). The rating followed a two-step procedure (Harter, 1985): first, children made a forced choice for each item (e.g., whether the puppet felt angry or not); second, they indicated the intensity of that feeling

by pointing to one of two emojis (e.g., red for very angry, orange for a little angry). Using this scale, preschoolers rated five items: how bossy the parent puppet was (i.e., felt pressure), how much the child puppet could act as it wanted (i.e., felt choice), how sad and angry the child puppet felt and how much the child puppet would want to collaborate with the parent puppet (i.e., proxy for compliance). Finally, preschoolers indicated how close the child puppet wanted to be to the parent puppet (i.e., proxy for connectedness), by placing the puppet in a box on a paper map ranging from close (1) to far away (4) from the parent puppet (see Figure 2B for paper map; see also Weinstein et al., 2010).

In Sample 2, the same set of outcomes was assessed. One additional outcome captured preschoolers' emotional evaluations more directly. Specifically, preschoolers were asked to express how the child puppet would feel by mimicking its emotional reaction with their own facial expressions. A photograph of each child's facial expression was taken by the student experimenter. These expressions were later analyzed for indicators of fear and anger using OpenFace 2.0 (Baltrušaitis et al., 2018). Three children were uncomfortable being photographed, so data from these participants are missing. Facial Action Units (AUs) were automatically detected (Baltrušaitis et al., 2015) and classified following EMFACS coding guidelines (Friesen & Ekman, 1983). Detection was successful in 86% of cases; images for which AUs could not be detected successfully were treated as missing. Specifically, fear was assessed by computing the average intensity score for AUs 1, 2, 4, 5, 7, 20, and 26; anger was assessed using AUs 4, 5, 7, and 23.

Parent-Reported Measures

Child Temperament. Parents completed the Dutch version of the very short form of the Children's Behavior Questionnaire (CBQ-VSF; Putnam & Rothbart, 2006) on a Likert scale ranging from 1 (*not at all true*) to 7 (*completely true*). Parents could also indicate an 8th option in case they never saw their kid in the given situation. The scale consists of 36 items and

assesses three factors (with 12 items each): Surgency/Extraversion (e.g., “My child is full of energy, even in the evening”), Effortful Control (e.g., “My child is good at following instructions”) and Negative Affectivity (e.g., “My child tends to become sad if the family’s plans don’t work out”). This scale has been widely used and validated in developmental research (Sleddens et al., 2011). For Sample 1, internal consistency was $\alpha = .62$ for Surgency/Extraversion, $\alpha = .74$ for Effortful Control, and $\alpha = .77$ for Negative Affectivity. In Sample 2, internal reliability was initially lower for Surgency ($\alpha = .57$), but after removing one item with weak item-total correlations, it improved to $\alpha = .71$. Reliability for Effortful Control and Negative Affectivity in Sample 2 was $\alpha = .64$ and $\alpha = .65$, respectively.

General Parenting Style. Parents completed four items of the Dutch version of the Parents as Social Context Questionnaire (PASCQ; Zimmer-Gembeck et al., 2015) to assess parental autonomy-support (e.g., “I always encourage my child to express his/her feelings”), as well as an eight-item, age-appropriate adaptation (Brenning et al., 2020) of Barber’s (1996) Psychological Control Scale (PCS) to assess parental psychological control (e.g., “I regularly try to change my child’s opinion”). Both scales were rated on a Likert scale from 1 (*completely disagree*) to 5 (*completely agree*). Internal reliability was $\alpha = .75$ for autonomy-support and $\alpha = .76$ for psychological control for Sample 1 and $\alpha = .61$ for autonomy-support and $\alpha = .66$ for psychological control for Sample 2.

Analytic strategy

Preliminary Analyses

We first tested whether the sociodemographic variables (child and parent age and gender) predicted any of the outcome variables using a linear mixed regression model, allowing the model to control for the dependent variance within each outcome. For Sample 1, we considered only children’s ratings of the domain-general sentences, as these were semantically constant across conditions (i.e., tone of voice and domain). Continuous variables

were centered. Further, we inspected descriptive statistics and Pearson correlations among all study variables.

Primary Analyses

Given that the tone of voice listened to was nested within participants, the Intra-Class Correlation (ICC) was calculated for all outcome measures to detect the proportion of between-subject variance relative to the total variance. The higher the ICC, the more appropriate it is to perform multilevel analyses. In a next step, we built linear mixed regression models using the 'lme4' package (Bates et al., 2015) to examine the main effects of manipulated tone of voice as a within-person predictor (Research Question 1).

Research questions 2-5 involved moderating effects by child temperament (i.e., surgency/extraversion, effortful control, negative affectivity; RQ2), parenting style (i.e., autonomy-support, psychological control; RQ3), social domain (i.e., personal, moral, prudential; RQ4) and semantic content (i.e., autonomy-supportive, controlling; RQ5). Analyses testing these effects were done through a series of stepwise analyses for each outcome separately. Specifically, for each model, a different centered between-person predictor was entered at the between-person level, with a cross-level interaction between the between-person predictor and prosody added to examine its moderating role. In each model, participants were included as random effect and we checked models for multicollinearity and their proportion of explained variance (i.e., marginal and conditional R^2). For clarity, we visualized significant two-way interactions including standardized simple slope coefficients. Analyses were conducted in R Studio (R Core Team, 2021) from which the syntax is available on our researchbox [blinded for peer review].

Results

Preliminary Analyses

In both samples, child age was associated with several outcomes. Older children

evaluated sentences as less supportive of choice (Sample 1: $\beta = -.21$, $t(144.06) = -3.88$, $p < .001$; Sample 2: $\beta = -.24$, $t(227) = -2.87$, $p < .001$) and reported more anger (Sample 1: $\beta = .14$, $t(145.33) = 2.34$, $p = .02$) or felt pressure (Sample 2: $\beta = .22$, $t(227) = 2.74$, $p = .01$).

These associations may reflect children's increasing desire for independence, with parental requests being generally experienced more negatively as they grow older. In Sample 2 only, children with older parents evaluated sentences as less pressuring ($\beta = -.22$, $t(227) = -2.61$, $p = .01$). No other sociodemographic variables were significantly associated with outcomes in either sample (all $ps > .05$).

Table 1 (Sample 1) and Table 2 (Sample 2) present descriptive statistics and multilevel Pearson correlations for all outcome variables. In both samples, similar patterns emerged across the within- and between-person levels. Fear and anger, both in self-reports and additionally in facial expressions for Sample 2, were positively related to each other and to felt pressure, and negatively related to felt choice, closeness, and intent to collaborate. Conversely, felt choice, felt closeness, and intent to collaborate were positively interrelated and negatively related to felt pressure.

At the between-person level, temperament and parenting style showed comparable associations with the study variables in both samples. Surgency was positively related to felt pressure in Sample 1 and to felt closeness in Sample 2. Effortful control was positively related to general autonomy support and negatively related to general psychological control in both samples, and additionally negatively associated with anger and surgency in Sample 2. General psychological control was positively associated with negative affect and negatively associated with general autonomy support in both samples.

Primary Analyses

Tone of Voice Effects on Preschoolers' Emotional and Motivational Responses

Unconditional models to assess intraclass correlations (ICCs) showed sufficient

variability at the between-person level for both samples for conducting full models, with ICCs ranging from .22 to .48. Linear mixed regression modelling showed that, across both samples, sentences spoken with a controlling, relative to autonomy-supportive, tone of voice were evaluated as more pressuring (Sample 1: $\beta = .08$, $t(932.72) = 3.39$, $p < .001$; Sample 2: $\beta = .18$, $t(227) = 2.76$, $p = .01$), and were associated with higher attributions of anger (Sample 1: $\beta = .09$, $t(931.55) = 3.65$, $p < .001$; Sample 2: $\beta = .15$, $t(227) = 2.96$, $p < .001$) and fear (Sample 1: $\beta = .10$, $t(928.38) = 4.20$, $p < .001$; Sample 2: $\beta = .17$, $t(227) = 3.28$, $p < .001$) in preschoolers. Additionally, in Sample 1, controlling sentences were evaluated as less supportive of choice ($\beta = -.09$, $t(935.55) = -3.50$, $p < .001$), while this effect was only marginally significant in Sample 2 ($\beta = -.09$, $t(227) = -1.67$, $p = .10$). Moreover, in Sample 2, preschoolers attributed higher levels of anger ($\beta = .06$, $t(1519) = 6.60$, $p < .001$) and fear ($\beta = .03$, $t(1519) = 3.27$, $p < .001$) in the child puppet, as reflected in their facial expressions after listening to a controlling tone of voice. No effects were found for closeness and collaboration (both $ps > .05$).

Interactions Between Tone of Voice, Child Temperament, Parenting Style, Social Domain and Semantic Content

Across both samples, out of all possible interactions between type of prosody and the four sets of potential moderators, only four appeared significant. Table 3 shows that, in Sample 1, prosody interacted with effortful control in the prediction of experienced pressure and felt closeness. Controlling prosody was evaluated as more pressuring (Figure 4A) and was associated with less felt closeness (Figure 4B) as compared to autonomy-supportive prosody among preschoolers low on effortful control. While the interaction effect on closeness was statistically significant, the simple slope at low levels of effortful control reached only marginal significance, suggesting a trend in the expected direction that should be interpreted with caution. Furthermore, Table 4 shows that, in Sample 2, prosody interacted

with effortful control in predicting fear evaluations. Specifically, children high in effortful control attributed higher levels of fear in the child puppet in response to controlling prosody, whereas autonomy-supportive prosody was associated with the lowest levels of fear in this group (Figure 5).

Finally, Table 5 reveals a significant interaction between prosody and the social domain in predicting preschoolers' attributed intent to collaborate (see Figure 6). This interaction was driven by marginally significant simple slopes, pointing to a modest moderation pattern that should be interpreted with caution. Controlling (relative to autonomy-supportive) prosody tended to reduce children's attributed intent to collaborate in the personal domain, yet to enhance attributed intent to collaborate in the moral domain. No significant interactions were found for parenting style or semantic content (all $ps > .05$). Overall then, these results suggest that children's differential evaluations of autonomy-supportive and controlling prosody generalize across differences in temperament, general parenting, social domain or semantic content of the message. However, given the limited statistical power to detect interaction effects, these results should be interpreted with caution.

General Discussion

The preschool period is a dynamic stage of development during which parents not only encourage exploration and learning but also begin to guide and regulate their child's behavior through everyday conversations and interactions (Grolnick et al., 2019). These interactions are essential for preschoolers' cognitive, emotional, and social development, as they provide the necessary guidance and support for children to explore and learn about their environment. A crucial, yet understudied, aspect of parents' communication is the tone of voice parents use when interacting with their preschoolers. The current study is among the first to examine preschoolers' emotional, motivational and behavioral evaluations of different types of parental prosody. Moreover, across two samples, we investigated the robustness of this effect by

considering dimensions of the child's temperament, general parenting style, the social domain of the communication, and the semantic content of the parents' message. Across two samples, preschoolers evaluated controlling, relative to autonomy-supportive, prosody as more pressuring and as eliciting more attributed negative emotional responses. These effects were largely robust across individual and contextual factors. Together, these findings indicate that preschoolers systematically differentiate between controlling and autonomy-supportive prosody in their evaluations.

Preschoolers' Responses to Controlling and Autonomy-Supportive Prosody

The current experimental study showed that, even at their young age, preschoolers evaluated a controlling tone of voice as more pressuring and less supportive of choice as compared to an autonomy-supportive tone of voice. Further, controlling prosody appeared to have affective costs as it was associated with higher attributed anger and fear, as evidenced not only by children's self-reports but also by objective analyses of their facial expressions when enacting the puppet's emotional reactions.

No direct effects were found on intentions to collaborate and felt closeness. These results suggest that tone of voice primarily shapes children's emotional evaluations of parent-child interactions, but that such evaluations do not necessarily translate into differences in children's attributed relational or behavioral tendencies. It is possible that the latter outcomes are more cognitively demanding for young children to evaluate, compared to more immediate emotional appraisals such as fear and anger. Or children's collaboration and proximity-seeking can be driven by various motivations, with controlling prosody eliciting less volitional and more loyalty-based and pressured reasons for complying with parental requests and staying close than autonomy-supportive prosody. Overall, the findings do indicate that children already differentiate between controlling and autonomy-supportive prosody at a young age, particularly in terms of emotions.

The current findings align with a growing body of research indicating that prosodic cues – particularly a controlling tone of voice – shape the way motivational intent is perceived and responded to across development (e.g., Gerson et al., 2019; Weinstein et al., 2019, 2020; Vrijders et al., 2024). Research with preverbal infants has shown that even very young children attend longer to controlling compared to autonomy-supportive tones, suggesting early discrimination between motivational qualities of speech (Gerson et al., 2019). The current study extends these findings to preschoolers, demonstrating that controlling prosody elicited more negative responses among preschoolers than autonomy-supportive prosody, including greater feelings of pressure and more negative emotions.

These findings carry practical implications for parenting. Given that preschoolers are already sensitive to the motivational quality of parental prosody, the way parents speak to their children – beyond *what* they say – may be an important target for parenting interventions. Encouraging parents to adopt an autonomy-supportive tone of voice when communicating with their preschoolers may help foster more positive everyday interactions, which may be beneficial for parents and children alike. This is particularly relevant given that the effects of prosody were found to be largely independent of child temperament, general parenting style, and the content of the message, suggesting that prosody may be a relevant channel of communication in parent-child interactions.

When considered in conjunction with prior studies with adolescents (Weinstein et al., 2019) and adults (Vrijders et al., 2024), the current results suggest that the influence of motivational prosody persists across development. Together, these findings underscore the importance of prosody as a component of motivational communication, from infancy through early childhood and beyond.

Robustness of the Prosody Effect

The effect of prosody appeared robust, as it was only minimally dependent on

characteristics of the child (i.e., child temperament), the parent-child relationship (i.e., general parenting style), the social domain of the communication, and the semantic content of the parental message. Indeed, a controlling tone of voice was evaluated more negatively by most children, as an interaction effect emerged in only 4 out of almost 100 possible interactions. The few interactions obtained were somewhat inconsistent across samples and should therefore be interpreted with much caution.

With respect to temperament, effortful control interacted with prosody in both samples, albeit inconsistently: in Sample 1, preschoolers low in effortful control attributed higher pressure and more distance in response to controlling prosody, whereas in Sample 2, preschoolers high in effortful control attributed increased fear. These findings provide a nuanced perspective on differential susceptibility theory (Belsky et al., 2007), suggesting that susceptibility may manifest differently for behavioral versus emotional outcomes. Effortful control may buffer against overt behavioral disruption while simultaneously heightening sensitivity to social cues, leading to stronger emotional responses such as fear in response to controlling tones of voice (Eisenberg et al., 2010; Muris & Geers, 2019). Given the inconsistency across samples, however, these findings should be interpreted with caution.

No interaction effects were found for general parenting style. So far, children do not seem particularly more sensitive to specific prosodic cues depending on their parents' general parenting style, although further research is needed.

With respect to social domain, controlling prosody tended to reduce attributed intent to collaborate in the personal domain but enhance it in the moral domain. In line with Social-Domain Theory (Smetana, 2006; Turiel, 2015), this suggests that a controlling tone may signal legitimacy in moral contexts while feeling intrusive in personal ones, where children expect greater autonomy (Soenens & Vansteenkiste, 2010). Notably, this interaction emerged for one outcome only and should be interpreted with caution.

Finally, no interaction effects were found for semantic content, which was unexpected given prior research demonstrating that tone and content can jointly influence listeners' responses (Reeve & Tseng, 2011; Vrijders et al., 2024). Preschoolers may be more sensitive to how something is said than to what is said, possibly because processing verbal content requires more advanced cognitive and linguistic abilities (Juszyk, 1997; Nazzi & Ramus, 2003). Methodological factors may also have contributed, as the between-person manipulation of semantic content may have limited sensitivity to detect subtle effects. Future research could benefit from within-person manipulations of both tone and content.

Limitations

While this study offers novel insights into how preschoolers respond to motivational prosody, several limitations warrant consideration and may guide future research. First, an indirect assessment method was used in which preschoolers rated audio stimuli by projecting themselves into hypothetical situations using puppets – a well-established technique for use with young children (Measelle & Ablow, 2017). Although the puppet interview has often been validated as a means of capturing children's perceptions (Essex et al., 2011; Measelle et al., 1998), it assessed children's reports of how the puppet would respond to a parent puppet, rather than capturing children's own direct responses to their caregivers. This methodological choice was made to ensure experimental control: all children heard the exact same audio excerpts, allowing for strong internal validity. By contrast, using excerpts from children's actual parents would compromise standardization across participants, making it more difficult to isolate the effects of tone of voice.

A related limitation is that the presented stimuli may reflect an amplified contrast between controlling and autonomy-supportive speech. In everyday interactions, parental communication typically varies along a continuum, so the extremes used in this study may not reflect day-to-day variation in parental speech patterns. Future research could complement the

current findings with observational data from real-life parent–child interactions to enhance ecological validity and generalizability and to better understand how motivational prosody operates in naturalistic contexts.

A further interpretive limitation concerns the nature of children's responses in the puppet interview. It is unclear whether children reported how they imagined the puppet would feel, or rather what they believed the puppet should feel given the social context of the interaction, a distinction that our task design cannot fully resolve. This ambiguity is not unique to the present study, but reflects a broader challenge inherent to self-report measures in young children, who are known to be sensitive to social context and may respond in line with perceived expectations (Barragan & Dweck, 2015). Several procedural measures were taken to minimize this risk: student researchers were instructed to remain neutral and refrain from providing feedback during the task, and experimenters were blind to the study hypotheses in one of the two samples. Nevertheless, future research could address this ambiguity by complementing self-report measures with observational measures of children's emotional responses.

Finally, this study did not include a neutral tone control condition, making it challenging to determine whether the observed effects are due a motivating effect of autonomy-supportive prosody, a de-motivating effect of controlling prosody, or a combination of both. Considering the small effect sizes, it is uncertain if preschoolers would have discerned the difference between a neutral tone and an autonomy-supportive tone. Additionally, the number of stimuli presented had to be carefully managed to avoid cognitive overload in participants. Future research should consider including a neutral control group to better understand whether it is controlling tones that undermine child well-being, autonomy-supportive tones that support it, or both (see Paulmann & Weinstein, 2023; Weinstein et al., 2019).

Conclusion

Findings of the current study highlight the importance of considering not only what

parents communicate to their preschoolers but also how they communicate it. Compared with autonomy-supportive prosody, controlling tones of voice were evaluated less favorably and were associated with greater pressure and more attributed negative emotional responses. Given that controlling prosody appears to be important in parent–child communication during early childhood, interventions aimed at reducing controlling communication styles, and promoting more autonomy-supportive alternatives, in preschoolers may therefore focus not only on the semantics of parents’ communication but also on their tone of voice.

Declaration of generative AI and AI-assisted technologies in the writing process

During the preparation of this work the author(s) used ChatGPT in order to improve the readability of the manuscript. After using this tool/service, the author(s) reviewed and edited the content as needed and take(s) full responsibility for the content of the published article.

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