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Listen to Your Mother:

Motivating Tones of Voice Predict Adolescents' Reactions to Mothers

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Abstract

Virtually nothing is known about the role that tone of voice may play in motivating interactions. Herein, we use an experimental approach to explore for the first time how the same directive instructions (“Do well at the play”) have different effects on adolescents depending on the motivational tone of voice used to convey these instructions. A sample of 1,000 adolescents aged 14-15 years was randomly assigned to hearing semantically identical messages that were expressed by mothers of adolescents with controlling, autonomy-supportive, or neutral tones of voice. Results suggest that the way speakers modulated their voice when intoning the same verbal messages affected adolescents’ emotional, relational, and behavioral intention responses. Listening to mothers making motivating statements in an autonomy-supportive, relative to a neutral, tone of voice elicited more positive and less negative emotions, increased closeness and intentional behavioral engagement among 14-15 year old adolescents, while the opposite set of findings emerged when adolescents listened to mothers making motivational statements in a controlling tone of voice. These findings elucidate how mothers’ spoken communications can impact adolescents, with implications for the quality of parent-child relationships, adolescents’ well-being and engagement.

Keywords: self-determination theory, adolescence, prosody, autonomy, education, emotions

Listen to Your Mother: Motivating Tones of Voice Predict Adolescents' Reactions to Mothers

Parents use verbal communications ongoingly to motivate and energize their adolescents to behave in desired ways. As an example, stimulating their children to engage schoolwork is a common challenge, and the ways in which parents navigate it might lead to different levels of academic success (e.g., Barnard, 2004; Hill & Tyson, 2009). Very little research has focused on the role that tone of voice – or prosody – plays in these motivating interactions. Imagine the phrase “get your homework done” said in a bossy tone of voice, and the same verbal message conveyed softly and with affection. Here, the same words may elicit very different reactions, yet almost nothing is known about the impacts on adolescents’ emotions, their effort and engagement in life’s tasks, and their feelings of closeness with parents. The present study examined how identical motivational schoolwork-related messages expressed through different tones of voice impact mid-adolescents who listen to them. Schooling was chosen as the central context given the critical role parents still play in this life domain (Grolnick & Slowiaczek, 1994; Patall, Cooper, & Robinson, 2008). Further, mid-adolescence was selected as the age range under study because it represents a developmental period when youngsters are especially sensitive to feeling controlled given their increasing desire to act independently and become self-reliant (Soenens, Vansteenkiste, & Van Petegem, 2018). During this period of their development, children increasingly widen the personal sphere over which they claim personal jurisdiction, as maintained by Social Domain Theory (Smetana, Crean, & Campione-Barr, 2005). That is, while in middle childhood, some domains may be still be perceived to legitimately fall under parents’ jurisdiction. With adolescents’ increasing urge to express their independence, these matters now become more sensitive such that 14-15-year-old adolescents more easily feel controlled when parents attempt to modify their behaviors. Though especially important during this

period of development, parents' use of motivational prosody is likely important for understanding how youngsters at all ages experience and respond to their social world, and the impact on their abilities to undertake developmental challenges that are managed and supported by grown-ups. Indeed, parents may use controlling or supportive tones of voice with infants through to young adults, and we know next to nothing about the potential impacts of this on youngsters.

Motivational Communications

Based on the theoretical framework provided by self-determination theory (Deci & Ryan, 1985a; Ryan & Deci, 2017), two types of motivational vocal communications are discerned which impact behavior in qualitatively different ways: those that express *control* and those that express *autonomy support* (Weinstein, Zougkou, & Paulmann, 2018).

Expressions of control impose pressure, and attempt to entice, coerce, or manipulate listeners to action. In contrast, those that express *autonomy support* convey a sense of encouragement and support for listeners' sense of choice and opportunity for self-expression, even while stating expectations for behavior. These communications are inviting and informational such that decisions to act are perceived as collaborative efforts between the motivator and the listener made in the context of a mutually respecting relationship (Ryan, La Guardia, Solky-Butzel, Chirkov, & Kim, 2005).

Motivational communications have been studied in terms of the words that speakers select to use in order to elicit a desired behavior. For example, using specific words and phrases such as 'have to' and 'should', and delivering verbal messages that contain threats of punishments, are all controlling forms of verbal communications as compared to more autonomy-supportive phrases such as 'you can decide for yourself' (Hodgins, Koestner, & Duncan, 1996; Ryan, 1982; Vansteenkiste, Simons, Lens, Sheldon, & Deci, 2004). Given it produces motivationally-specific outcomes, such phrasing has been employed as

manipulations of motivation in lab studies (Hodgins, Brown, & Carver, 2007; Levesque & Pelletier, 2003), and coded as part of indexes of autonomy-supportive and controlling environments in naturalistic samples (Reeve & Jang, 2006; Wuyts, Vansteenkiste, Mabbe, & Soenens, 2017). For instance, Vansteenkiste, Simons, Lens, Soenens, and Matos (2005) manipulated via written vignettes the use of words such as “you should” and “you have to” (i.e., controlling condition) or, alternatively, “I ask” and “I propose” (i.e., autonomy-supportive condition) in communicating health messages to obese early adolescents. They found that controlling communications undermined children’s conceptual learning when contrasted against the more autonomy-supportive comparison condition.

Separate from the literature examining how motivation is *communicated*, a more substantial literature evidences the benefits to adolescents of *feeling* autonomy-supported more than controlled. As an example, adolescents in both Russia and the U.S. experience more self-motivation for their academics and a higher sense of well-being when they perceive their parents and teachers to be autonomy-supportive rather than controlling (Chirkov & Ryan, 2001). Although the two motivational qualities are often treated as two ends of a continuum, growing evidence points to their having distinct outcomes in various contexts (Vansteenkiste & Ryan, 2013), including parenting (Costa et al., 2016), sport coaching (Bartholomew et al., 2011) and teaching (Jang, Kim, & Reeve, 2016). Research shows that, above and beyond the autonomy support experienced, controlling environments may be uniquely harmful in terms of emotional and self-regulation outcomes, for example leading to unhealthy weight control in adolescent girls and depression (Soenens, Park, Vansteenkiste, & Mouratidis, 2012). As such, additional empirical tests are needed separating each of their unique contributions, and further research is needed to examine the role of (vocal) communications in perceptions of being autonomy-being supported or controlled.

The Sound of Motivation

As described above, investigators have typically focused on identifying the nature and outcomes of the *words* speakers select to use when communicating motivation, but new evidence points to the importance of the tone of voice used through which a motivating directive is conveyed. Informed by work on affective prosody (see e.g., Paulmann, 2016, or Mitchell & Ross, 2013), recent work on motivational prosody (Weinstein et al., 2018) has shown that the two motivational qualities of autonomy support and control differ systematically in terms of their acoustic characteristics. Specifically, autonomy-supportive phrasing uses a lower volume and less vocal energy in high frequency bands when compared to intoning controlling phrasing (Weinstein et al., 2018). Listening to these voice patterns, even when not linked to specific motivational words, led adults to report feeling more pressured and less supported for their choice, suggesting that tone alone can effectively communicate motivational qualities (Zougkou, Weinstein, & Paulmann, 2017).

Engagement Following Motivational Requests

Though it appears that motivational prosody can be more controlling or autonomy-supportive in nature, it is unclear whether and how these different tones impact on adolescents. Building on studies that examine how the behaviors or words used by socializing agents (e.g., parents, teachers) impacts youngsters (e.g., Pinquart, 2017), we explore the reach that motivational tones have in shaping adolescents' emotional and relational experiences. As can be noticed in Figure 1, we further test whether these, in turn, help to explain a link between motivating tones and adolescents' effort and cooperation for school activities.

Although available taxonomies on engagement adopt a heterogeneous approach, differentiating between emotional, cognitive, and behavioral engagement (Skinner et al., 2008), we focus on behavioral engagement intention as it constitutes a visible marker of adolescents' underlying motivation and predicts critical outcomes, including adolescents' achievement and drop-out (e.g., Henry, Knight & Thornberry, 2012). Specifically, we

explore adolescents' behavioral intentions to engage with school activities after listening to motivating tones of voice, as reflected by their intended efforts to engage schoolwork and to cooperate with mothers' requests.

The first of these indicators, effort, is particularly important within the school context since engagement in learning typically decreases in the middle school years (Anderman & Maehr, 1994), and yet children who perceive their parents as autonomy-supportive are more motivated to engage in school, and in part for this reason attain higher grades (Grolnick & Ryan, 1989; Soenens & Vansteenkiste, 2005; Vasquez et al., 2016). In contrast, adolescents' perception of a controlling parenting style predicts academic disengagement (Roth, Assor, Niemiec, Ryan, & Deci, 2009). Further, additional evidence is derived from evaluations of autonomy-supportive teachers, who tend to inspire a greater desire in their students for expending effort for studies and taking on challenges, both when teachers are naturally autonomy-supportive (Jang, Reeve, & Deci, 2010), and after receiving training to be more autonomy-supportive (Cheon, Reeve, & Moon, 2012). Conversely, if teachers are perceived to be controlling, students report avoiding taking up challenging schoolwork (Bartholomew et al., 2018), suggesting both forms of motivation predict engagement in ways consistent with those observed within the parenting literature.

A second key indicator that motivational communications have been effective is cooperation, the willingness of adolescents to behave in line with parents' requests. There is reason to believe that autonomy-supportive motivational climates are key to eliciting cooperation in adolescents (Van Petegem et al., 2017). Previous research has also suggested that perceiving caregivers to be controlling predicts adolescents' desire to respond in a way which is opposite to that which had been requested (Vansteenkiste, Soenens, Van Petegem, & Duriez, 2014) – effectively representing an absence of cooperation. A separate literature shows a similar effect: based in psychological reactance theory (Brehm, 1966), recent

empirical work has shown that when parents restrict freedom they elicit this desire to behave in opposition to requests (Van Petegem, Soenens, Vansteenkiste, & Beyers, 2015). Similar to effort, it seems that cooperation can be increased and defiance reduced when caregivers are perceived to be autonomy-supportive, but it is yet unclear the extent to which verbal communications, broadly, and tones of voice, specifically, contribute to such benefits.

Proximal Determinants of Behavioral Engagement

We further explore outcomes which should be more proximal to the motivational framing; namely, the experience of positive and fewer negative emotions (*intrapersonal* outcomes) and closeness with parents (an *interpersonal* outcome). Both have ties with the motivational climates characterizing relationships (Weinstein, 2014), and furthermore should themselves predict behavioral outcomes such as adolescents' engagement. Importantly for this contribution, both constructs, that is, positive emotions (Lewis, Huebner, Reschly, & Valois, 2009; Linnenbrink, 2007; Reschly, Huebner, Appleton, & Antaramian, 2008a) and perceiving interpersonal closeness (Furrer & Skinner, 2003; Grolnick, Gurland, DeCoursey, & Jacob, 2002; Wentzel, 1998) have been linked to more effort and engagement with school activities.

Research emerging from SDT has provided compelling evidence that being autonomy-supported more than controlled relates to more positive *emotions* and fewer negative ones. These studies show that positive and less negative emotions are experienced when coaches (e.g. Gagné, 2003; Reinboth, Duda, & Ntoumanis, 2004), and teachers (e.g., Reeve, 2006) are autonomy-supportive, or as a function of experimental variations in autonomy support provided to adolescents (Savard, Joussemet, Pelletier, & Mageau, 2013) and young adults (Weinstein et al., 2008). Further, studies of parent-adolescent interactions suggest that parental autonomy support breeds more positive, and less negative, emotions both in the more collectivist culture of China and the more individualist one of North

America (Lekes, Gingras, Philippe, Koestner, & Fang, 2010). In addition, even when undertaking fairly uninteresting tasks, such as certain school activities, autonomy-supportive framing breeds more positive emotions during task engagement (Joussemet, Koestner, Lekes, & Houliort, 2004). More proximal to the present research, in a first study of this type, adults who listened to semantically neutral sentences with identical words used in each condition, but intoned in autonomy-supportive prosody, reported more positive emotions and fewer negative emotions following the listening task (Weinstein et al., 2018).

Within a much larger body of work focusing on the importance of positive relationships between parents and their children (Baldwin, 1948; Jeynes, 2007; Laursen, Coy, & Collins, 1998), *closeness* to parents has been shown to foster more engagement in school during adolescence (Ryan, Stiller, & Lynch, 1994), while relating negatively to anti-social behavior (Criss, Shaw, & Ingoldsby, 2003). Further, motivational contexts are important for shaping the extent that the parent-child relationship is experienced as positive and intimate (Zimmer-Gembeck, Ducat, Clear, Mastro, & Van Petegem, 2018). Further, perceiving parents as being controlling versus autonomy-supportive in relation to school increases adolescents' feelings of resentment, and reduces intimacy (Roth & Assor, 2012), thereby creating distance in the parent-child relations. Also, parents observed to adopt an autonomy-supportive communication style when talking about the friendships of their mid-adolescents have been observed to display greater behavioral reciprocity, contributing to both adolescents' and parents' sense of connection and mutuality (Wuyts, Soenens, Vansteenkiste, & Van Petegem, 2018). In light of such findings, it is reasonable to predict that autonomy-supportive tones should enhance closeness, while controlling tones should reduce it, with closeness, in turn, predicting engagement with the motivated behavior (Furrer & Skinner, 2003; Grolnick et al., 2002; Wentzel, 1998).

Present Study

Although a rapidly growing literature shows that autonomy-supportive environments, either as perceived by adolescents themselves or experimentally induced, can promote positive emotional and relational responses to motivators, thereby fostering cooperation (Van Petegem et al., 2017), there are still several important gaps in our understanding. First and most important for the current study, no work has sought to examine the role that tone of voice plays in motivating adolescents (or children), and thus, we do not yet know whether different types of prosody yield differential results when communicating the same messages to youngsters. Although parents' autonomy-supportive motivating style among early and mid-adolescents has been observed (e.g., Wuyts et al., 2018), this work failed to separate the effect of autonomy-supportive practices as such (e.g., offering a rationale) from the tone used to communicate these practices. Second, that the vast majority of prior work on parental autonomy support and control is correlational in nature, which calls for an experimental approach to infer causal conclusions (see Deci et al., 1993, for an exception conducted with younger children aged 6-7 years which did not consider tone of voice). Finally, although studies have focused on whether youngsters' school engagement, felt emotions, and closeness with their parents depends on their perceived degree of autonomy support and control, no prior research has attempted to test these various constructs in an integrated model, as displayed in Figure 1.

The overall aim of the present study was twofold. First, we aimed to test whether motivating tones of voice could shape the effectiveness of communications as reflected in adolescents' degree of behavioral engagement, that is, their willingness cooperate with and to put effort into parents' requested behavior. Second, we sought to examine the processes that may account for the presumed engagement-boosting effect of autonomy-supportive prosody. Specifically, we considered two proximal mediators, that is, adolescents' experienced emotions (as an intrapersonal outcomes) and their felt closeness to their parents (as an

interpersonal outcome). To pursue these two aims, we collected a sample of 1,000 adolescents with an experimental design that manipulated the tone of voice used by actual mothers of adolescents to deliver semantically identical sentences requesting and directing adolescents to school-related behaviors, using either a controlling, an autonomy-supportive or a neutral tone. Congruent with our two aims, the following four hypotheses were tested. First, experimentally induced autonomy-supportive tones would elicit more engagement, as reflected in greater effort and cooperation, than both controlling and neutral tones (Hypothesis 1a), while controlling tones would reduce adolescents' engagement when compared to neutral tones (Hypothesis 1b). Second, before testing the mediating role of felt emotions and closeness, we first examined whether autonomy-supportive tones would elicit more positive and less negative emotions, and greater closeness with the parents, than either neutral or controlling tones (Hypothesis 2a), while controlling tones would reduce adolescents' positive emotions, increase their negative emotions, and reduce closeness compared to neutral tones (Hypothesis 2b). Finally, we formally tested the mediational hypothesis that through increasing closeness and positive versus negative emotions, the autonomy-supportive tone condition would predict more engagement intention (effort and cooperation; Hypothesis 3a), whereas through reducing closeness and positive versus negative emotions, the controlling tone condition would predict reduced engagement intention (effort and cooperation; Hypothesis 3b).

Method

Participants

One-thousand British adolescents from England, Scotland and Wales (519 aged 14 years; 481 aged 15 years) took part in the experiment. Of these, $n = 486$ were males and $n = 514$ were female. Only participants who lived with their mother a majority or all of the time were recruited for the study, and 86% lived with both parents, whereas 14% lived with their

mothers, only. This increased the relevance of the task for adolescents responding to mothers' tones in the auditory stimuli. This study used a quota sampling approach undertaken by the Polling company ICM Unlimited. ICM unlimited relies on an online panel previously recruited through various methods, including at random via telephone, via random online sampling, and through active recruitment and engagement programs. To recruit for the current study, an invitation email containing the link to the survey was mailed out to a batch of panel sample, who were selected to be contacted based on their age being between 14-15 years of age. As recruitment was undertaken by ICM Unlimited we do not have access to data regarding how many parents or adolescent participants refused to take part. Participants were paid by ICM Unlimited. As is standard for work ICM Unlimited conducts with underage participants, parental consent was first acquired, and then adolescents were asked to complete the survey and provided their own consent. Caregivers were asked to be absent for this portion of the study. No hard quota controls were set for the data collection, but soft quotas were used to ensure a good spread of respondents by adolescent age, gender, and geographic region in England, Scotland, and Wales. Ethical approval for this study was attained through the University of Oxford Department of Psychology Ethics Committee, as project *cross-sectional study of British adolescents* (# SSH OII C1A 17 063).

Materials

Experimental manipulation. Auditory stimuli delivered sentences spoken by three current mothers of adolescents who were Native British English speakers and recruited for the purposes of this study, but who did not have prior involvement with the researchers of the study. Sentences were neutral in terms of motivational semantics, identical across the three conditions, and adapted from Weinstein et al. (2018). They focused on the school domain (e.g., directive to complete homework). All mothers read the same fifteen sentences for each of the three conditions: in a controlling, autonomy-supportive, and neutral tones of voice.

Mothers received scenarios instructing them on autonomy-supportive and controlling motivational climates. Stories depicted in the scenarios were adapted from one or more of the vignettes in the General Causality Orientations Scale (Deci & Ryan, 1985b), a measure of autonomous and controlled orientation that describes interpersonal contexts imbued with motivational qualities. A similar training approach was undertaken by Weinstein et al. (2018) to train professional actors to intone motivational prosody. Mothers were seen individually for the recording session. All mothers intoned sentences from all conditions in a block design, with condition order counterbalanced. Each sentence was repeated until the speaker was happy that she intoned appropriately to the condition as she saw it. Distance between speakers and recording device was measured so that all three speakers would be the same distance from the microphone.

A rating study was performed to validate these sentences and select those which most effectively communicated autonomy support and control. To do this, thirty parents of adolescents were recruited on Prolific Academic and asked to listen to all sentences, presented in a random order. Raters were asked to report on the extent to which each statement was pressuring (1 “*not pressuring at all*” to 5 “*very pressuring*”), as well as the extent to which each statement supported a sense of choice (1 “*does not support choice*” to 5 “*supports choice very much*”). Since the semantic content of sentences was identical across conditions, ratings reflected motivation as conveyed through tone of voice. Initially, each of the three speakers provided 15 sentences. We then selected the best performing ten, each as a set of three consisting of the given sentence spoken in all three conditions. We did this by identifying those sets which received high scores in a matching category (e.g., autonomy-supportive sentences that were perceived to be high in supporting choice), and low score on the mismatching category (e.g., controlling sentences that were perceived to be high in supporting choice). In addition, we looked for neutral sentences that were not particularly

high on either outcome. In each case, sentences were treated as sets across speakers and conditions, and we tried to identify those sets that had high performing stimuli across all three speakers and all three conditions.

The final set of sentences consisted of 30 sentences for each condition (10 statements from each speaker), including “It’s time now to go to school”, “you will read this book tonight”, and “you will do well on this assignment”. Based on the sample of 30 parents who evaluated motivational content in these stimuli, results of two repeated measures analyses of variance (ANOVAs) showed main effects of condition on perceived speaker pressure and perceived speaker support for choice. Sentences differed in terms of their perceived support of choice, $F(2, 58) = 68.66, p < .001$, such that autonomy-supportive sentences were seen as being more supportive of choice ($M = 3.23, SE = .06$) than neutral sentences ($M = 2.82, SE = .05; t(29) = 7.18, p < .001$), which were, in turn, more supportive of choice than controlling sentences ($M = 2.47, SE = .07; t(29) = 6.76, p < .001$). In line with this, autonomy-supportive sentences were also perceived to be more supportive of choice than controlling ones ($t(29) = 9.36, p < .001$). Sentences also differed in terms of their perceived pressure ($F(2, 58) = 93.75, p < .001$), such that controlling sentences were more pressuring ($M = 3.79, SE = .09$) than neutral sentences ($M = 3.05, SE = .06; t(29) = 10.82, p < .001$), which were more pressuring than autonomy-supportive sentences ($M = 2.68, SE = .06; t(29) = -4.89, p < .001$). As might be anticipated, controlling sentences were also more pressuring than autonomy-supportive ones ($t(29) = 11.35, p < .001$).

Survey responses. All survey responses were paired with the following instructions: “On a scale of 1 (*Fully disagree*) to 7 (*Fully agree*), to what extent do you agree or disagree with the following statements? If my mother spoke to me like the women I just listened to, I would feel...”

Manipulation check. To test the extent to which the manipulation was effective in

communicating autonomy support and control, two items were included that served as manipulation checks. Adolescents reported the extent to which they would feel that “If my mother spoke to me like the women I just listened to, I would feel that she insists on doing everything in her way”. Responses across all three conditions showed sufficient variability, varying from 1-7 with an $M = 5.10$, $SD = 1.49$. Adolescents also agreed to the item “If my mother spoke to me like the women I just listened to, I would feel that she shows interest in me and is willing to listen”; with responses across all three conditions showing sufficient variability, varying from 1-7 and averaging, $M = 3.78$, $SD = 1.70$.

Engagement intention. Engagement intention was operationalized via adolescents’ self-reported intentions to exert effort and to be cooperative. For *effort*, participants responded on the same scale as above to three items taken from the effort subscale of the Intrinsic Motivation Inventory (IMI; Ryan et al., 2016, with further validation in McAuley, Duncan, & Tammen, 1989): “Put a lot of effort into my studies”, “Try very hard to do well at those things my mum is talking about”, “Put much energy into this”. Internal consistency was high, $\alpha = .86$, and the items were averaged for an overall score reflecting more willingness to put forth effort into the parent-requested activities.

To assess adolescents’ intended *cooperation*, participants responded to two face-valid items, one reflecting a lack of cooperation (i.e., defiance; Vansteenkiste et al., 2014; “I would be inclined to do the exact opposite of what my mother expects me to do”) and a second item reflecting cooperative intentions (i.e., “I would commit myself to the task and cooperate”). As the two items correlated ($r = -.48$, $p < .001$) defiance was subtracted from cooperation to create a relative cooperativeness score, which ranged from -6.0 to 6.0 ($M = 0.11$, $SD = 2.69$).

Mediators. To measure both positive and negative emotions, we adapted items from the Differential Emotions Scale, which had been validated for use with adolescents (Kotsch, Gerbing, & Schwartz, 1982). Participants responded in terms of their happy (happy, pleased,

satisfied; $\alpha = .90$), activated positive (energetic, interested, excited; $\alpha = .86$), and calm positive (calm, peaceful, relaxed; $\alpha = .89$) emotions. As the reliability of a 9-item composite score was high ($\alpha = .95$), they were compiled to create an average score of positive emotions. Participants also responded in terms of their sad (gloomy, sad, miserable; $\alpha = .84$), scared (afraid, scared, frightened; $\alpha = .89$), angry (angry, mad, irritated; $\alpha = .84$), and disgraced (ashamed, guilty, embarrassed; $\alpha = .70$) emotions. As reliability of the 12-item composite score was satisfying ($\alpha = .71$), they were compiled for an average score of negative emotions.

Participants also responded to five items taken from the relatedness subscale of the IMI (Ryan, Mims, & Koestner, 2016), which asked about their perceived closeness to mothers using the same prompt that had been used throughout: “If my mother spoke to me like the women I just listened to, I would...”, and included items: “Feel close to her”, “Feel like I could really trust her”, “Feel really distant to her” (r), “Feel like she really trusts me”, and “Want more interaction with her” ($\alpha = .87$).

Procedure

Adolescent participants completed the study online. Participants were randomly assigned to one of three conditions manipulating motivational tone of voice. These between-subject conditions presented the voices of mother-speakers whose tone of voice was: (1) Controlling ($n = 331$), (2) Autonomy-Supportive ($n = 333$), or (3) Neutral ($n = 336$). For each condition, adolescents heard audio files presenting in a randomized order the same three mothers intoned sentences; all confirmed they had heard the study stimuli. They thus heard 30 sentences, comprised of the three speakers expressing 10 unique sentences. Across conditions, these sentences were semantically identical but with systematically varying tones of voice as described above. Although the motivational tone quality was a between-subject factor, speakers were held constant across conditions; all three speaker voices were

represented within a given condition. These stimuli were presented together in a random order, and all adolescents heard all three speakers' voices as part of one stimulus package.

Following this listening task, adolescent participants responded in terms of their perceptions of speakers as being autonomy-supportive or controlling (a manipulation check), their engagement intention, operationalized in terms of both effort and cooperation, and their positive and negative emotions and closeness. These surveys were embedded in the same online form as the experimental stimuli and presented in a fully randomized order. However, audio stimuli and each of the surveys was presented on a separate page of the online study.

Results

Preliminary Tests

All analyses were conducted on SPSS statistical software (IBM SPSS, 2011). Pearson correlations linking study outcomes for descriptive purposes are presented in Table 1. Further, as a check of the effectiveness of the manipulation, a multivariate analysis of variance (MANOVA) simultaneously tested the effect of manipulated motivational tone on adolescents' perceived speakers' autonomy support and control. As can be noted in the upper half of Table 2, experimental condition predicted both perceived speakers' autonomy support, and perceived control. Post-hoc analyses following on this showed that the Autonomy-Supportive condition promoted more perceived speakers' autonomy support than both the Controlling ($t(666) = 7.28, p < .001$) and the Neutral condition ($t(668) = 5.21, p < .001$), while the Controlling condition predicted less perceived speakers' autonomy support relative to the Neutral condition ($t(663) = -2.05, p = .04$). A similar, yet opposing set of findings emerged for perceived control. The Autonomy-Supportive condition prompted less perceived control compared to either the Controlling ($t(666) = 7.80, p < .001$) or the Neutral condition ($t(668) = 4.34, p < .001$), whereas the Controlling condition increased perceived speaker control ($t(663) = 3.43, p = .001$) in comparison to the Neutral condition. In sum, the three

conditions manipulated perceived speakers' control and autonomy support as had been intended; the manipulation was successful.

Primary Analyses

We first evaluated our hypothesized effects that autonomy-supportive tones would bolster adolescent engagement intention (Hypothesis 1a), and the presumed mediators positive emotions and closeness (Hypothesis 2b), while controlling tones would undermine these outcomes (Hypothesis 2a and 2b, respectively). To do this, we conducted a single MANOVA testing the main effects of condition on all our primary outcomes and mediators simultaneously. The omnibus effect of condition on these outcomes was in evidence, and gave grounds for further examination of condition effects on our primary outcomes of interest ($F(10, 1986) = 18.28, p < .001, \eta^2 = .08$). Main effects of condition predicting each separate outcome within the same multivariate general linear model are summarized in Table 2.

Engagement intention. As can be noticed in Table 2, condition showed a main effect on both engagement indicators, that is, effort and cooperation. Follow-up post-hoc analyses comparing each motivational prosody condition with one another indicated the Autonomy-Supportive condition promoted greater effort and cooperation than either the controlling condition ($ts(666) = 5.34$ and $5.19, ps < .001$, for effort and cooperation respectively) or the neutral comparison condition ($ts(668) = 5.14$ and $5.20, ps < .001$, for effort and cooperation respectively). Unlike what we had expected, the Controlling condition did not differ from the Neutral comparison ($t(663) = -0.18, p = .84$) in predicting effort, although the Controlling condition reduced adolescents' cooperation relative to the Neutral comparison ($t(663) = -2.77, p = .006$). These findings, on the whole, supported Hypothesis 1 that speakers' use of prosody would shape adolescents' engagement intention in response to motivating messages.

Mediators. As for the mediators, the univariate effects on positive and negative emotions as well as closeness were all significant (see Table 2). Results of post-hoc

comparisons showed that the Autonomy-Supportive condition promoted more *positive emotions* than both the Controlling ($t(666) = 10.02, p < .001$) and the Neutral ($t(668) = 8.31, p < .001$) conditions, while there was no difference between the Neutral and Controlling conditions ($t(663) = -1.70, p = .09$). As for *negative emotions*, the Autonomy-Supportive condition elicited less negative emotions than both the Controlling ($t(666) = 11.27, p < .001$) and the Neutral condition ($t(668) = -6.77, p < .001$). In this case, the Controlling condition also led to higher negative emotions ($t(663) = 4.45, p < .001$) than did the Neutral condition. Finally, as for *closeness*, the Autonomy-Supportive condition produced more *closeness* than both the Controlling condition ($t(663) = -9.49, p < .001$) and the Neutral condition ($t(668) = 9.49, p < .001$), whereas the Controlling condition undermined it as compared to hearing neutral voices ($t(663) = -1.98, p = .048$). Thus, much as the facilitative effect of the Autonomy-supportive condition was more robust and systematic for the engagement outcomes, this was also the case for the hypothesized mediators. Autonomy support predicted more positive and less negative emotions, and greater closeness, as compared to both the Controlling and the Neutral condition. The undermining impact of the Controlling, relative to the Neutral, condition was especially evident for negative emotions. Taken as a whole, the present findings largely confirm Hypothesis 2.

Mediational Analyses

Mediational analyses using the PROCESS macro (Andrew, 2013) obtained bias-corrected bootstrapped estimates. Models tested whether condition would predict engagement intention (operationalized in terms of both effort and cooperation) through its effects on adolescents' positive and negative emotions and felt closeness. To achieve this, six models contrasted (1) Autonomy-Supportive versus Neutral condition, (2) Controlling versus Neutral condition, and as a supplementary analysis: (3) Autonomy-Supportive versus Controlling condition. Further, each condition contrast separately predicted each of two outcomes: (1)

effort, and (2) cooperation. Thus, the six PROCESS models reflected the three condition contrasts predicting each of two outcomes.

To compare the effects of the two motivational prosody conditions (Autonomy-Supportive and Controlling) in PROCESS, two dummy codes were made, which effectively contrasted the Autonomy-Supportive and Neutral conditions (Dummy 1: coding Autonomy-Supportive = 1; Neutral and Controlling = 0), and Controlling and Neutral conditions (Dummy 2: coding Controlling = 1; both Neutral and Autonomy-Supportive = 0). To achieve this comparison, each analysis predicted outcomes from one dummy code while defining the alternative dummy code as a covariate, resulting in two separate models. This approach is computationally identical to using such dummy codes as simultaneous predictors in a multiple regression model (Hardy, 1993). As such, in effect a first model tested the effects of the Autonomy-Supportive condition versus the Neutral condition, whereas the second model tested the effects of the Controlling condition versus the Neutral condition. In other respects the two analyses were identical. See Figure 1 for an illustration of the two models, and Table 3 for a summary of statistical findings.

Autonomy-supportive versus neutral tones. As can be seen in Table 3, results of a first model showed that positive emotions (in Figure 1, path labeled a_1*b_1 ;) and closeness (Figure 1; a_3*b_3), linked the Autonomy-Supportive condition to higher *effort*, although negative emotions did not. The mediators fully accounted for the direct effect (originally, path c) of the Autonomy-Supportive condition on effort, which was no longer statistically significant after their inclusion (Figure 1; c' ; $b = .11$, $se = .07$, $t(994) = 1.57$, $p = .12$, $c'_{ps}{}^1 = .08$).² A second model predicting *cooperation* from the autonomy-supportive condition

¹ c'_{ps} = partially standardized indirect effect was used as a measure of effect size for the mediated direct effect (Preacher & Kelly, 2011).

²It is worth noting that links between mediators and outcomes in these models were correlational in nature. Based on extant literature informed by self-determination theory, we hypothesized that positive emotions and feelings of closeness would foster adolescents' engagement intention, but we assume a causal direction here that

showed that negative emotions and closeness (but not positive emotions) linked the Autonomy-Supportive condition to higher cooperation, though the two mediators did not fully account for the direct effect (path c) of the Autonomy-Supportive condition on cooperation ($b = .52, se = .17, t(994) = 3.03, p = .003, c'_{ps} = .19$); that is, the mediated direct effect predicting cooperation (Figure 1; c') remained significant,

Controlling versus neutral tones. A third model found weaker effects predicting *effort* from the Controlling condition. In this model, the Controlling condition was not linked to effort through its effects on positive or negative emotions (Table 3). Similar to findings for the Autonomy-Supportive condition, closeness linked the Controlling condition with effort. However, the direct effect of the Controlling condition (Figure 1; c') on effort was still significant when accounting for the three proposed mediating factors ($b = .14, se = .07, t(994) = 2.14, p = .03, c'_{ps} = .10$). A final model testing the effects of the Controlling prosody condition on *cooperation* showed this condition was indirectly linked to less cooperation through its effects on negative emotions, and closeness, although there was no link through positive emotions, as can be seen in Table 3. The direct effect of the Controlling condition (Figure 1; c') on cooperation dropped to non-significance when accounting for the three proposed mediating factors ($b = -.18, se = .16, t(995) = -1.08, p = .28, c'_{ps} = -.07$), suggesting that negative emotions and lowered closeness were responsible for the effects that controlling tones had on lower adolescent cooperation.

Autonomy-supportive versus controlling tones. To supplement analyses which compared Autonomy-Supportive and Controlling conditions separately to the neutral comparison, we tested mediational effects with the two experimental conditions defined as predictors and the Neutral condition excluded from consideration. Thus, in a final pair of

the method does not support. Indeed, mediation analyses similarly supported an alternative model wherein prosody predicts emotions and closeness through its effects on engagement intention.

models we tested in PROCESS the indirect effect of Autonomy-Supportive versus Controlling conditions on effort and cooperation through positive emotions, negative emotions, and closeness. Findings are shown in Table 3. Predicting *effort*, findings supported the presence of indirect effects through positive emotions, and closeness, but not negative emotions. Predicting *cooperation*, findings supported the presence of indirect effects through both positive and negative emotions ($b = .56, se = .11, 95\% CI [.36, .79], ab_{ps} = .21$), as well as closeness. Further, these three mediators fully accounted for the effects on condition on *effort*, which reversed direction when accounting for their variance ($b = -.21, se = .07, t(667) = -2.94, p = .003$), and *cooperation*, which similarly reversed direction when accounting for their variance ($b = -.38, se = .18, t(667) = -2.12, p = .04$).

Discussion

Findings from this study suggested, in sum, that the tone of voice used by motivators – in this case speakers who were themselves current mothers of adolescents – can impact adolescents' emotional, relational, and behavioral intention responses to motivational messages. Across most outcomes, adolescents who listened to mothers making motivational statements in a controlling tone of voice responded in undesirable ways. In contrast, autonomy-supportive tones elicited positive reactions from listeners as compared to listening to mothers who used a neutral tone of voice to deliver their motivational sentences.

Are all Motivational Tones of Voice Created Equal? Their Relation with Engagement

Given the goal of motivating messages is by and large to inspire others to action, we focused on two indicators that the motivational messages were effective in this: cooperation with parents and intentions of putting forth effort. Here, cooperation was operationalized in terms of self-reported willingness to cooperate and lower desire to defy, or rebel, against motivational messages. In previous research, autonomy-supportive versus controlling motivational contexts, operationalized through written vignettes, increased adolescents'

tendency to cooperate with parents (Van Petegem et al., 2015, 2017), and in this study we saw that this type of cooperation could be elicited merely by the tone of voice that parents use when delivering their motivating messages. Further, we obtained evidence for independent effects for autonomy-supportive tones increasing cooperation, and controlling tones independently reducing cooperation with motivating mothers. This is important because eliciting cooperation from youngsters is a key purpose of effective motivation and defiance has furthermore been linked to additional behavioral problems in previous longitudinal research (Van Petegem et al., 2015). This suggests that using controlling versus autonomy-supportive tones might create cyclical and maladaptive patterns characterizing parent-child relationships. In this context, these may also have further implications for school engagement if controlling communications, through tone or otherwise, breed disengagement with education, which leads to further parental control (e.g., Hafen & Laursen, 2009).

Complementing the findings predicting cooperation, here, adolescents who had listened to controlling sounding motivating school-related sentences anticipated they would invest less effort in school activities. This finding is important keeping in mind that parents are key to promoting academic success (Barnard, 2004), and because engagement into schoolwork generally diminishes in adolescence (Anderman & Maehr, 1994). However, this reduction can be buffered by motivational climates that feel supportive (Ryan & Patrick, 2001; Wang & Holcombe, 2010). Within SDT, autonomy-supportive parenting styles have been shown to increase effort, with implications for children's grades (Grolnick & Ryan, 1989; Grolnick et al., 1991; Roth et al., 2009; Soenens & Vansteenkiste, 2005). In this study, we extend and inform the previous research by identifying that such effort might be elicited merely through the tones of voice used by parents. Furthermore, while most of the past research has focused on contrasting autonomy-supportive with controlling motivations, here

we found that both motivational qualities affected intended effort independently, when compared to neutral tones used to deliver the same motivational sentences.

Why Do Different Motivational Tones Relate Differently to Engagement?

A second key aim of the present study was to shed light on the processes underlying the differential predictive role of autonomy-supportive and controlling tones of voice on adolescents' engagement. As a first process underlying behavioral engagement, we found that motivational prosody shapes emotions in youngsters who listened to directive sentences. Analyses comparing both motivational conditions to a neutral comparison showed that listening to autonomy-supportive prosody enhanced positive emotions and reduced negative emotions in adolescents. Interestingly, the controlling condition led to higher negative emotions but not to lower positive emotions. This is in line with findings from the past that control and autonomy support do not consistently function as two ends of a continuum, but rather show distinct effects on emotional and behavioral outcomes (Chen et al., 2015). Mediational analyses further showed that emotions prompted by different tones of voice could account for the effect of tone of voice on intentional engagement, although results were at times driven by shifts in positive emotions and at other times by changes in negative ones. These findings are important in light of past research suggesting that adolescents' positive emotions, in particular, and negative emotions to a lesser extent, tend to promote engagement in schools (Reschly, Huebner, Appleton, & Antaramian, 2008b). They also inform previous research suggesting that parents and adolescents' emotions tend to co-vary with those of their parents (Larson & Richards, 1994). Possibly, parents who are experiencing distress themselves are more controlling (Grolnick et al., 2002), which, these data suggest, can elicit negative emotions in youngsters merely through the tone of voice parents use.

Importantly, motivating speakers influenced adolescent engagement through changing the experience of interpersonal *closeness*. Specifically, adolescents expressed they would feel

closer to their own mother were she to use autonomy-supportive tones, and tended to report less closeness after hearing controlling tones. Yet, the effects were stronger for autonomy support than for control. Intriguingly, even in this artificial situation, autonomy-supportive tones could improve the quality of the relationship, though presumably, the effects would be even more robust in the context of meaningful, live, interpersonal interaction. Such findings extend previous work suggesting that *perceiving* autonomy-support enhances interpersonal closeness (Adie, Duda, & Ntoumanis, 2008; Roth & Assor, 2012; Weinstein et al., 2008); here, we found that merely *hearing* an autonomy-supportive tone of voice is sufficient of producing similar benefits, while merely hearing controlling tones may alienate and isolate adolescents, with implications for engagement with school, as demonstrated by the mediational findings presented herein. Indeed, apart from felt emotions, felt closeness played a robust and consistent mediating role, accounting for the engagement-boosting effect of autonomy-supportive tone and the engagement-depriving effect of a controlling tone.

Future Directions and Limitations

Although the present study focused on tone of voice used by mothers, these findings speak to the potential impacts tone of voice use has for teachers or coaches. If, indeed, autonomy-supportive tones enhance engagement partly through encouraging more positive emotions and relationship closeness, we may expect to see that teachers who effectively communicate motivational language positively impact the learning and well-being of students in their classrooms. Similarly, teachers' use of controlling tones could undermine these varied and consequential positive outcomes. Tone of voice might therefore help to explain how youngsters respond to motivators with variable engagement in school (Assor, Kaplan, & Roth, 2002; Reeve, 2006), well-being (Adie, Duda, & Ntoumanis, 2012; Chirkov & Ryan, 2001; White et al., 2008), and performance (Adie et al., 2012; Gillet, Vallerand, Amoura, & Baldes, 2010). Notably, our proposed mediational model, while grounded well within the

extant literature informed by SDT (Ryan & Deci, 2017), assumed causal relationships between our mediator and outcomes, which were nevertheless assessed at the same moment in time. In ideal circumstances, the presumed mediator and outcome are separately assessed, which better justifies their serial ordering in a sequential model. In fact, an alternative model, with engagement being the explanatory mechanism underlying the relation between manipulated tone of voice and felt emotions and closeness also yielded significant indirect effect indexes. As such, future research should examine the nature of the causal pathways between these outcomes of interest.

Our findings do not only inform the developmental and motivational literatures per se, but contribute to a growing body of evidence on how social intentions (e.g., affective or motivational meanings) are communicated through our voice alone (see Kreiman & Sidtis, 2011, for review). In particular, the current investigation is first to look at the effects tone of voice can have on adolescents' well-being. Previous research has by and large focused on the ease (or difficulty) with which listener can recognize the intended vocal signal but has ignored exploring how these affective or motivational signals affect individuals directly. Here, we show that motivational prosody can influence self-reported well-being measurements, in line with results testing adult listeners (Weinstein et al., 2018). It would be exciting to see in future studies if and how prosody can impact physiological responses (e.g., heart rate or skin conductance response) and how long lasting these effects may be. The results open up new possibility to explore the effects of motivational (but also affective) prosody in different contexts (e.g., work environment, educational context), and highlight how important it is for speakers to not only choose their words, but also their tone, wisely.

The findings of this study should be viewed in light of several potential limitations. First, findings relied on adolescents' self-reports and may have been subject to bias, for example, broadly positive or negative reactions to tone of voice may have colored all

responses independent of the construct being studied (Marsh & MacDonald Holmes, 1990). Future studies using behavioral outcomes or independent observers would go a long way toward a better understanding of the impacts of motivational tones on adolescents and children. Furthermore, manipulations relied on the tones of mothers whom adolescents did not know. While this approach maximized internal validity with stimuli that were free from associations from previous experiences, a fascinating approach would be to use participants' own mothers' voices recorded while intoning both autonomy-support and control. This approach may offer more external validity as adolescents' responses would represent their perceptions of actual relationships. In a similar vein, audio recordings of naturalistic observations wherein parents and motivators are encouraging youngsters' behaviors would provide a nice complement to the present findings, and controlling and autonomy-supportive climates can be induced in parents in lab settings. A final consideration is that the present sample relied on an albeit large, but restricted sample of 14-15 year olds. This age may be particularly sensitive to controlling climates (Barber & Harmon, 2002), and results should be replicated in other age groups to evaluate the robustness of the effects, as well as whether the underlying mechanisms remain the same across age groups.

Conclusion

Despite these limitations, the present study evaluated a large cohort of adolescents to understand, for the first time, how and to what extent motivational tones affect adolescents. We found experimental evidence that listening to autonomy-supportive tones enhanced behavioral engagement intention in part through its effects on positive and negative emotions, and feelings of closeness, while controlling tones undermined these positive reactions to motivational speakers. Findings thus suggest a powerful role for parents' voices that merit consideration as part of a broader understanding of the impacts of parents on youngsters' well-being and behavior.

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Table 1

Correlations Between Outcome Variables Across Conditions.

	1	2	3	4	5	6
1. Perceived autonomy support	---					
2. Perceived control	-.36**	---				
3. Effort	.61**	-.30**	---			
4. Cooperation	.58**	-.34**	.60**	---		
5. Positive affect	.68**	-.40**	.68**	.50**	---	
6. Negative affect	-.50**	.43**	-.50**	-.51**	-.55**	---
7. Closeness	.69**	-.42**	-.42**	.58**	.81**	-.54**

Notes. ** $p < .001$; $n = 1000$.

Table 2

Means for Lowest Level Outcome Variables for Each of Three Conditions (Controlling, Neutral, Autonomy-Supportive); F value for the Effect of Condition, and Effect Size for the Effect of Condition.

	<i>M</i> Control (<i>SD</i>)	<i>M</i> Neutral (<i>SD</i>)	<i>M</i> Autonomy support(<i>SD</i>)	<i>F</i> *	η^2
Manipulation Checks					
Perceived autonomy support	3.38 _a (1.66)	3.65 _b (1.74)	4.32 _c (1.52)	28.02	0.05
Perceived control	5.53 _a (1.35)	5.14 _b (1.49)	4.65 _c (1.51)	30.37	0.06
Engagement Intention					
Effort	3.63 _a (1.35)	3.65 _a (1.44)	4.20 _b (1.31)	18.47	0.04
Cooperation	-0.44 _a (2.66)	0.13 _b (2.77)	0.63 _c (2.55)	13.55	0.03
Mediators					
Positive emotions	2.60 _a (1.28)	2.77 _a (1.27)	3.59 _b (1.27)	57.05	0.10
Negative emotions	4.05 _a (1.22)	3.64 _b (1.24)	3.01 _c (1.12)	63.98	0.11
Closeness	3.18 _a (1.36)	3.39 _b (1.41)	4.19 _c (1.33)	50.43	0.09

Note: η^2 or eta squared is the measured of effect size for differences between the three conditions. Subscripts a-c denote mean differences across conditions. An _{a, b, c} pattern across the three condition means denotes significant differences across all conditions, whereas we also observed an _{a, a, b} pattern meaning the Controlling condition did not differ from the Neutral condition.

*Degrees of freedom for all *F* values were (2, 997); *ps* < .001.

Table 3.

Statistical Findings for Indirect Effects Identified in the Six Mediation Models.

	Figure 1 path	Effort				Cooperation				
		<i>b</i>	<i>se</i>	95% CI	<i>ab_{ps}</i>	<i>b</i>	<i>se</i>	95% CI	<i>ab_{ps}</i>	
Autonomy-supportive vs. Neutral										
Positive emotions	a ₁ *b ₁	.12	.04	.05, .19	.09	.15	.08	-.02, .31	.05	
Negative emotions	a ₂ *b ₂	-.004	.02	-.04, .04	.003	.32	.06	.20, .46	.12	
Closeness	a ₃ *b ₃	.54	.08	.39, .70	.39	.56	.11	.37, .78	.21	
Controlling vs. Neutral										
Positive emotions	a ₁ *b ₁	-.02	.02	-.06, .00	-.02	-.03	.03	-.09, .007	-.01	
Negative emotions	a ₂ *b ₂	.00	.01	-.02, .03	.00	-.21	.06	-.35, -.10	-.08	
Closeness	a ₃ *b ₃	-.14	.08	-.29, -.003	-.10	-.15	.08	-.30, -.006	-.06	
Autonomy-supportive vs. Controlling										
Positive emotions	a ₁ *b ₁	.16	.05	.07, .27	.12	.29	.13	.05, .55	.11	
Negative emotions	a ₂ *b ₂	-.07	.04	-.15, .02	-.05	.56	.11	.36, .79	.21	
Closeness	a ₃ *b ₃	.68	.09	.53, .86	.50	.59	.14	.33, .88	.22	

Note: Bolded results are considered statistically significant as 95% CI (confidence intervals)

did not cross 0. *ab_{ps}* = partially standardized indirect effect was used as a measure of effect

size for the predictor - mediator - outcome link (Preacher & Kelly, 2011).

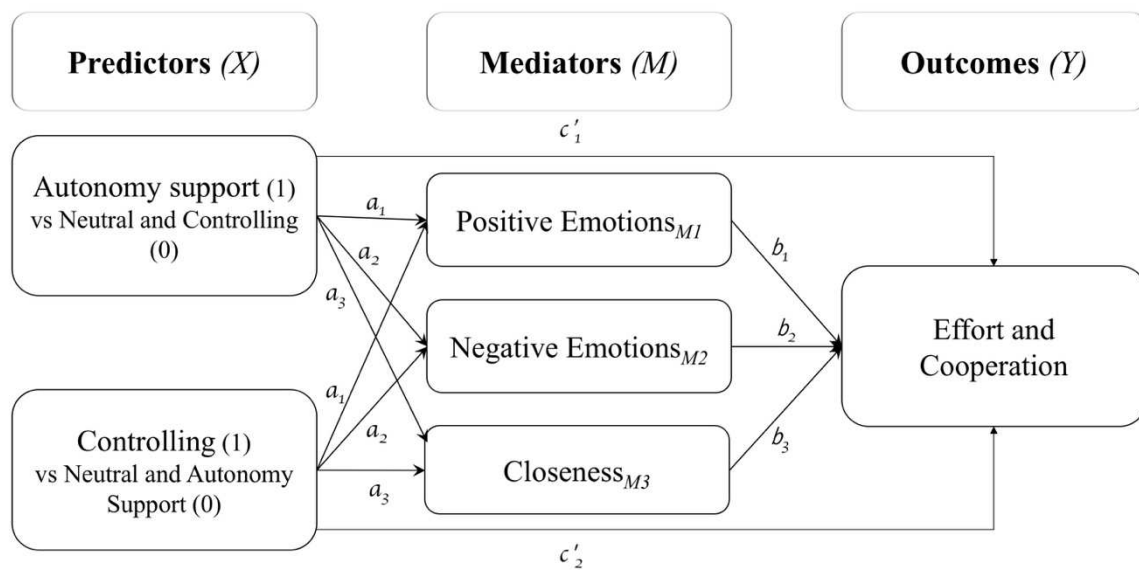


Figure 1. Indirect effect analyses tested in two models, predicting engagement from conditions linked by emotions and closeness. Models defined one dummy coded variable (e.g., comparing Autonomy Support to the two other conditions or comparing the Controlling tone to the other two conditions), and covaried out the alternative dummy code. The three mediators were tested simultaneously; the two outcome variables were tested in models predicting each, separately.