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van Kleef, G.A.; Larsen, M.; Stamkou, E.

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ORIGINAL PAPER

How music teachers' emotional expressions shape students' performance: "C'est le ton qui fait la musique"

Gerben A. van Kleef[3] · Maybritt Larsen[1,2] · Eftychia Stamkou[1]

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Abstract

Teachers, parents, and other feedback providers commonly express positive emotions to stimulate learning. When students' performance is below expectations, however, feedback providers may be inclined to express negative emotions. How these different emotional styles shape students' development remains poorly understood. Here we investigate the effects of music teachers' positive versus negative emotional expressions on their students' musical performance. We draw on emotions as social information (EASI) theory, which postulates that the effects of emotional expressions depend on targets' information-processing motivation (which determines whether feedback is extracted from emotional expressions) and agreeableness (which determines the perceived appropriateness of positive vs. negative expressions). We followed music teachers and students during regular learning sessions. One week before the sessions, we assessed students' dispositional information-processing motivation and agreeableness. Immediately after the sessions, students reported on their teachers' emotional expressions during the session, and teachers rated the performance of students on two musical tasks. An outside expert evaluated recordings of a subset of these performances. Consistent with the EASI framework, students who were confronted with stronger positive emotional expressions of their teachers performed better to the extent that they were lower on information-processing motivation and higher on agreeableness. Conversely, students who were confronted with stronger negative emotional expressions performed better to the degree that they were higher on information-processing motivation and lower on agreeableness. These findings indicate that both positive and negative emotional expressions of teachers can benefit students' performance, depending on the student's personality. We discuss implications for feedback, emotions and education.

Keywords Emotional expression · Feedback · Teaching · Music · Performance · Personality

Introduction

It is well established that learning and development are shaped by performance feedback (Hattie & Timperley, 2007; Kluger & DeNisi, 1996). Such feedback may be explicit, as when another person comments on one's performance (Shute, 2008) or more implicit, as when another person shows nonverbal signs of approval or disapproval (Fernald, 1993; Sorce et al., 1985). One particularly common form of nonverbal feedback consists of other's emotional expressions (Keltner & Haidt, 1999; Van Kleef, 2009), which may serve as positive or negative reinforcers of behavior (Cacioppo & Gardner, 1999). For instance, a smile may signal appreciation, and a frown lack thereof. Despite the prevalence of such expressions in the context of feedback provision, their consequences are poorly understood.

A fundamental unanswered question is whether human development is better served by positive or negative emotional expressions of feedback providers. On the one hand, there is a widespread belief, at least in the Western world, that positive, encouraging emotional expressions support learning and performance, certainly in children and adolescents (Waters, 2011). On the other hand, subpar performance may evoke—and perhaps even call for—negative emotional expressions that signal discontent and a need for improvement (Reyna & Weiner, 2001). Here, we address this paradox by examining how the effects of teachers' positive

Literal translation: "it's the tone that makes the music".

✉ Gerben A. van Kleef
g.a.vankleef@uva.nl

[1] University of Amsterdam, Amsterdam, The Netherlands

[2] Present Address: Larsen & Buhl, Zeewolde, The Netherlands

[3] Department of Social Psychology, University of Amsterdam, PO Box 15900, 1001 NK Amsterdam, The Netherlands

versus negative emotional expressions on students' performance are shaped by students' personalities.

Emotional expression and human development

Research in a variety of areas indicates that emotional expressions and the feedback they convey shape development, but the nature of this influence is unclear. For instance, studies in developmental science show that parents' emotional styles influence children's social-emotional competence, yet the evidence is inconclusive regarding the direction of the effects (Eisenberg et al., 1998). Parents' positive emotional expressions are generally associated with children's development of social-emotional skills (for a review, see Bariola et al., 2011). However, the pattern for negative emotional expressions is less consistent (Bariola et al., 2011; Halberstadt et al., 1999), with some studies finding negative associations with children's mental health (e.g., Denham et al., 2000) and social-emotional development (e.g., Garner, 1995; Garner & Power, 1996) and other studies finding positive associations (e.g., Eisenberg et al., 2003).

Similarly mixed findings emerged in social and organizational psychology. One study showed that positive emotional expressions of a team member facilitated team cooperation by eliciting positive emotions in fellow teammates (Barsade, 2002). Other studies found that leaders' positive emotions facilitated team performance (George, 1995) and coordination (Sy et al., 2005), in part by instigating a positive affective climate (Sy et al., 2005), whereas leaders' negative emotions undermined performance (Gaddis et al., 2004). However, other studies found that expressions of negative emotions such as anger enhanced motivation (Van Kleef et al., 2010), learning (Hareli et al., 2013; Van Doorn et al., 2014), and team performance (Van Kleef et al., 2009), whereas positive emotional expressions undermined effort (Sy et al., 2005).

Closer to the central question of the present research, studies on the effects of teachers' emotions on students' performance in different educational settings also produced mixed results. In one study, students who were exposed to teachers' positive emotional displays reported enjoying the task more, but students who were exposed to teachers' negative emotional displays were more productive on the task (Cheng et al., 2021). In another study, perceptions of teacher anger were positively correlated with anticipated subsequent effort among 6th-graders, whereas perceptions of anger were negatively correlated with anticipated effort among 3rd-graders (Butler, 1994).

It is clear from this research that emotional expressions can impact observers' development, learning, and performance. What is much less clear is when positive or negative emotional expressions are more conducive to favorable performance outcomes. This lack of clarity mirrors a pattern in the broader (non-emotional) feedback literature, where beneficial learning effects of both positive and negative feedback have been documented (Hattie & Timperley, 2007; Kluger & DeNisi, 1996). Notably, such equivocal evidence is also seen in research on feedback in the specific context of music education, which has yielded evidence for advantageous as well as disadvantageous effects of both positive and negative feedback (McPherson et al., 2022).

With regard to positive feedback, some evidence points to favorable consequences for students' motivation and performance. A meta-analysis of experimental studies revealed that verbal positive feedback (praise) produced an increase in students' intrinsic motivation (Cameron & Pierce, 1994). Accordingly, music and elementary education students considered positive feedback the most effective and desirable teaching style (Wolfe & Jellison, 1990). Furthermore, a qualitative study among music teachers highlights the importance of positive feedback encounters in enhancing student engagement and performance (de Bruin, 2023). However, scholars have also argued that positive feedback can have debilitating effects on students' performance (Hattie & Clarke, 2018). Empirical support for this possibility comes from a lab study showing that detailed feedback without praise had more favorable effects on students' essay scores than did feedback accompanied by praise (Lipnevich & Smith, 2008). Indeed, meta-analytical evidence indicates that praise can decrease students' performance (Kluger & Denisi, 1996). In short, the effects of positive feedback on performance appear to be rather variable (Balcazar et al., 1985) and subject to moderating influences (Hattie & Timperley, 2007; Kluger & DeNisi, 1996).

With regard to negative feedback, theoretical arguments and empirical findings indicate that identifying discrepancies between current and desired mastery or performance can motivate greater effort (Hattie & Timperley, 2007). For instance, negative feedback in the form of lower grade results can enhance learning by increasing students' motivation (Kanfer, 1990). In one study, nursing students who received negative feedback subsequently demonstrated more accurate self-assessment (a precursor to improved performance) than students who received positive feedback (Kim & Lee, 2019). In another study, negative feedback directed highly-achieving students' attention to the self (Brunot et al., 1999), which can be helpful in ameliorating performance. However, other work indicates that negative feedback can lead students (especially those with lower self-esteem) to question their ability to perform tasks and undermine their motivation on subsequent assignments (Kernis et al., 1989), thereby instigating a spiral of reduced effort and performance (Lindsley et al., 1995). Finally, some research revealed no noticeable effects of negative feedback. For instance, in a study in the

context of music education, music teachers' negative feedback statements were not found to have any positive or negative impact on students' performance (Duke & Henninger, 1998). In other words, the effects of negative feedback, too, are mixed and subject to moderating influences (Hattie & Timperley, 2007; Kluger & DeNisi, 1996).

In sum, research from a variety of adjacent areas has produced mixed evidence for the effectiveness of various forms of positive versus negative feedback, including positive versus negative emotional expressions, on students' learning and performance. Indeed, scholars and practitioners alike have very different ideas about the value of positive and negative emotional expressions in educational settings (Van Doorn et al., 2014). As long as it remains unclear when one or the other approach is more conducive to learning and performance, developmental and educational opportunities will be missed, and learning and performance outcomes can be expected to be suboptimal. In the current research, we draw on Emotions as Social Information (EASI) theory to develop and test novel hypotheses about when positive or negative emotional expressions are more likely to enhance performance.

Emotions as social information (EASI) theory

EASI theory (Van Kleef, 2009, 2016) is rooted in social-functional approaches to emotion, which hold that emotions have evolved because they enable individuals to respond adequately to situational demands (Darwin, 1872; Frijda, 1986; Keltner & Haidt, 1999; Parkinson et al., 2005). Specifically, EASI theory postulates that emotional expressions contribute to social coordination by eliciting affective reactions (mutual emotions, positive or negative sentiments) and/or inferential processes (inferences regarding the causes, meaning and implications of the emotional expressions) in observers. The relative potency of these processes in driving behavioral responses to emotional expressions depends on the observer's information-processing depth and on the perceived appropriateness of the emotional expression.

The theory posits that inferential processes become more predictive of behavioral responses to the degree that observers of an emotional expression engage in more thorough information processing and perceive the emotional expression as appropriate; conversely, affective reactions become more predictive of behavior to the extent that observers engage in less thorough information processing and perceive the emotional expression as inappropriate (Van Kleef, 2016). By shifting the relative prominence of inferential versus affective processes, these moderators shape the behavioral consequences of emotional expressions (for a review, see Van Kleef & Côté, 2022).

Regarding information processing, research has documented that momentary information-processing depth is a function of variable situational factors as well as stable dispositional factors. For instance, information-processing motivation is increased by situational factors such as personal involvement and accountability, and decreased by environmental noise, fatigue, time pressure, cognitive load and power (Fiske & Dépret, 1996; Kruglanski & Webster, 1996).

Information-processing depth is also shaped by stable individual differences in information-processing motivation (Kruglanski & Webster, 1996; Moskowitz, 1993; Neuberg & Newsom, 1993; Webster & Kruglanski, 1994). Individuals with greater information-processing motivation have a stronger desire to understand the world around them and to incorporate new information in such understanding (Chaiken & Trope, 1999; Kruglanski, 1989). Accordingly, individuals with greater dispositional information-processing motivation were found to reflect more deeply on the meaning and implications of others' emotional expressions (Van Kleef et al., 2004). Moreover, in team performance settings, such individuals were more likely to use others' emotional expressions to gauge their current performance levels (Van Kleef et al., 2009).

The direction of the effects of situational and dispositional characteristics on momentary information-processing depth and concomitant processing of other people's emotional expressions is similar (for a review, see Van Kleef & Côté, 2022). However, unlike the effects of situational factors, the influence of dispositional factors can be expected to manifest itself across different contexts, because dispositional tendencies toward greater or lesser information processing are rooted in relatively stable personality traits (Kruglanski & Webster, 1996; Moskowitz, 1993; Neuberg & Newsom, 1993; Webster & Kruglanski, 1994).

Regarding the perceived appropriateness of emotional expressions, research has also established effects of both situational and dispositional characteristics. Situational influences on perceived appropriateness include characteristics of the emotional expression itself as well as the broader context within which it is emitted. For instance, emotional expressions tend to be perceived as less appropriate to the degree that they are more intense (Cheshin et al., 2018; Geddes & Callister's, 2007) or seen as inauthentic (Côté et al., 2013). The perceived appropriateness of emotional expressions also depends on global cultural (Kitayama et al., 2006) and local organizational (Rafaeli & Sutton, 1987) "display rules" that dictate which emotions are fitting to show and which ones are not (e.g., expressions of anger are more acceptable in some cultures and industries than in others) as well as on characteristics of the relationship between expresser and perceiver, such as power and status (people tend to accept more

from individuals higher rather than lower in the hierarchy; Porath et al., 2008).

The perceived appropriateness of emotional expressions is also shaped by dispositional factors (Van Kleef, 2016), most notably individual differences in the Big-Five personality trait agreeableness (Costa & McCrae, 1992). Individuals high on agreeableness value social harmony; they tend to be courteous, thoughtful and considerate to other people, and to avoid conflict (McCrae & Costa, 1987). Because they value harmony, they also expect others to treat them with courtesy (Graziano et al., 1996). Conversely, individuals lower on agreeableness more often get into arguments, do not shy away from conflict and are less preoccupied with maintaining social harmony (McCrae & Costa, 1987). Accordingly, they expect less courtesy from other people and are less sensitive to inconsiderate behavior (Graziano et al., 1996). As a result, all else being equal, individuals lower in agreeableness tend to deem expressions of negative emotions such as anger more appropriate (Van Kleef, 2016) and to respond more favorably to such expressions compared to their more agreeable counterparts (Van Kleef et al., 2010). Conversely, agreeable individuals can be expected to respond more favorably to positive emotional expressions, which fit their desire for social harmony, although direct evidence for this possibility is lacking.

As is true for information processing, the direction of the effects of situational and dispositional characteristics on the perceived appropriateness of emotional expressions is similar (Van Kleef & Côté, 2022). However, the influence of dispositional factors such as agreeableness can be expected to manifest itself across different situations due to the fact that they are rooted in stable individual differences (McCrae & Costa, 1987).

Altogether, EASI theory predicts that observers' behavioral responses to others' emotional expressions are shaped by observers' momentary information-processing depth and the perceived appropriateness of the emotional expressions, which in turn depend on individual and situational characteristics. In the current research, we use this theoretical framework to derive novel hypotheses about the effects of teachers' emotional expressions on students' performance. Specifically, we develop predictions about how the effects of music teachers' emotional expressions on students' musical performance are shaped by individual differences in students' dispositional information-processing motivation and agreeableness.

Current research and hypotheses

Is students' performance better facilitated by positive or negative emotional expressions of teachers? EASI theory suggests both can be effective, depending on whether observers' responses are primarily driven by affective reactions (mutual emotions, positive or negative sentiments) or inferential processes (inferences regarding the causes, meaning, and implications of the emotional expressions). On the one hand, positive emotional expressions may enhance students' performance by creating an atmosphere of positivity (Hatfield et al., 1994), mutual liking (Clark & Taraban, 1991) and enjoyment (Frenzel et al., 2009), within which students can safely explore, make mistakes, learn, develop and improve their performance (Fredrickson, 2001; Lyubomirsky et al., 2005). Conversely, negative emotional expressions may undermine learning and performance by generating an unpleasant atmosphere (Brett et al., 2007), eliciting negative emotions in students (Barsade, 2002), and undermining rapport (Van Beest et al., 2008).

On the other hand, negative emotional expressions may enhance performance by signaling that behavioral adjustment is needed, whereas positive emotional expressions suggest all is well (Cacioppo & Gardner, 1999; Keltner & Haidt, 1999). Negative emotional expressions can be interpreted as a sign that greater effort is required (Sy et al., 2005), which may boost motivation and performance (Van Kleef et al., 2010). Conversely, positive emotional expressions suggest performance is satisfactory, which can result in coasting (Van Kleef et al., 2009).

Given that both positive and negative emotional expressions can theoretically enhance performance, it is critical to consider moderators of the performance consequences of emotional expressions. As noted above, EASI theory posits that the relative prevalence of affective versus inferential processes (and therefore the likelihood that positive or negative emotional expressions enhance performance) depends on students' information-processing depth and the degree to which they perceive their teachers' emotional expressions as appropriate (Van Kleef, 2016). Here, we examine both of these theoretical moderators to disentangle the effects of teachers' positive versus negative emotional expressions.

Building on previous work that has demonstrated reliable effects of dispositional information-processing motivation on momentary information-processing depth (Kruglanski & Webster, 1996; Moskowitz, 1993; Neuberg & Newsom, 1993; Webster & Kruglanski, 1994) as well as the concomitant processing of emotional expressions (Van Kleef et al., 2004, 2009), we focus on individual differences in information-processing motivation in the current research. Likewise, drawing on prior research that has uncovered reliable effects of individual differences in agreeableness on the desire for social harmony (McCrae & Costa, 1987) and courteous treatment (Graziano et al., 1996) and concomitant effects on the perceived appropriateness of emotional expressions (Van Kleef et al., 2010), we focus here on individual differences in agreeableness.

Integrating the theoretical arguments laid out above, we hypothesized that students who are confronted with positive emotional expressions of their teachers perform better to the extent that they are lower on information-processing motivation (and therefore less likely to interpret the teacher's emotional expressions as a license to reduce effort) and higher on agreeableness (and therefore more appreciative of the teacher's positive approach). Conversely, students confronted with negative emotional expressions should perform better to the degree that they are higher on information-processing motivation (and therefore more likely to interpret the teacher's emotional expressions as a call for greater effort) and lower on agreeableness (and therefore less likely to be affronted by the teacher's negativity).

Method

We tested our hypotheses in a naturalistic field study among music teachers and students. We operationalized the theoretical moderators stipulated in EASI theory by means of stable individual differences in information-processing motivation and agreeableness to alleviate concerns about reverse causality. We collected data from three distinct sources (students, their respective teachers, and other teachers who provided independent ratings of the same students) across different timepoints to minimize common method variance (Podsakoff et al., 2003), as detailed below.

Sample

The sample consisted of 102 students (55 female, 47 male) and 23 teachers (9 female, 14 male) from a Dutch music school, who were involved in long-term student–teacher relationships. Students were between 12 and 19 years old ($M = 13.34$, $SD = 1.93$). They followed lessons in piano/keyboard ($n = 30$), guitar ($n = 27$), woodwind/brass instruments ($n = 18$), violin/cello ($n = 7$), drums/percussion ($n = 6$), and singing ($n = 13$). They had taken classes for an average of 3.60 years ($SD = 2.65$) and spent on average 2.61 h per week on self-study ($SD = 1.94$). Teachers were between 22 and 66 years old ($M = 47.36$, $SD = 12.54$). They had taught piano/keyboard ($n = 6$), guitar ($n = 6$), woodwind/brass instruments ($n = 6$), violin/cello ($n = 3$), drums/percussion ($n = 2$), and singing ($n = 1$) for an average of 19.10 years ($SD = 11.90$).

Procedure and Materials

Prior to data collection, teachers and parents of students received written information about the study and provided their consent. The study protocol was approved by the local ethics review board (project number 2013-SP-2860).

Time 1

In the first week of data collection, we measured students' agreeableness and information-processing motivation using validated scales. Agreeableness was measured using a subscale of the Revised NEO Personality Inventory-Short Form (Costa & McCrae, 1992). We dropped three overly complicated items and slightly rephrased others to increase understandability for the current sample. The resulting nine-item scale demonstrated adequate reliability ($\alpha = 0.73$). Examples of items are: "I try to be courteous to other people," "I am thoughtful and considerate," and "Most people I know like me" (1 = *not at all*, 7 = *very much*).

Information-processing motivation was measured using the personal need for structure scale (Neuberg & Newsom, 1993), a reliable and parsimonious index of individual differences in the tendency to search for and incorporate new information (Moskowitz, 1993; Rietzschel et al., 2007). We dropped three complex items involving double negations and slightly rephrased others for ease of comprehension. The resulting eight-item scale showed good reliability ($\alpha = 0.81$). Sample items are: "I hate to change my plans at the last minute," "I don't like situations that are uncertain," and "I enjoy having a clear and structured way of life" (1 = *not at all*, 7 = *very much*). To facilitate interpretation, we reverse-scored the scale so that higher scores indicate greater dispositional information-processing motivation (Neuberg & Newsom, 1993).

Finally, we measured demographics of teachers and students.

Time 2

In the second week of data collection, teachers and students engaged in regular private teaching sessions, which were similar to the sessions they would have outside of the current study. At the end of the sessions, students performed two musical tasks that matched the type of skills teachers in this music school routinely taught their students: a standardized musical reproduction task and a free improvisation task, both of which were tailored to the respective instrument. We encouraged teachers to audio-record these performances, which yielded recordings of 60 out of 102 reproduction-task performances (59%) and 53 out of 102 improvisation-task performances (52%). Immediately after the session, students and teachers completed questionnaires individually.

Students reported on the emotions their teacher had expressed during the regular part of the session (i.e., before the performance tasks). We used four items to measure students' perceptions of their teachers' positive (happy, enthusiastic, proud, satisfied; $\alpha = 0.82$) and negative (angry, disappointed, frustrated, irritated; $\alpha = 0.92$) emotional expressions (1 = *not at all*, 7 = *very much*). We also measured teachers'

experienced emotions using the same items (positive emotions: α = 0.90; negative emotions: α = 0.83) to enable establishing convergent validity.

Teachers rated their students' performance on the two musical tasks (i.e., reproduction and improvisation) on 10-point scales (1 = *very bad*, 10 = *very good*). The focus in the reproduction task was on the careful and accurate execution of a musical piece based on sheet music provided by the teacher, whereas the focus in the improvisation task was on free musical expression that allowed students to draw on their natural artistic tendencies without requiring high-level formal musical knowledge (Dutton, 2009; Leslie, 1987). Ratings of students' performance on the reproduction and improvisation tasks were substantially correlated ($r = 0.58$, $p < 0.001$) and combined in a single index of musical performance ($M = 6.85$, $SD = 1.40$). (We also examined performance on the individual tasks for exploratory purposes. Details are provided in the Supplementary Materials.) To establish the validity of teachers' performance ratings, the audio recordings that were available for a subset of the performances were also (blindly) rated by an external expert coder (a teacher at a different music school) and similarly combined into a single performance index ($M = 6.66$, $SD = 0.74$).

After data collection, all participants received a written debriefing and thank you note.

Results

Preliminary analyses

Students' perceptions of their teachers' positive and negative emotional expressions correlated significantly with teachers' reports of their experienced positive and negative emotions ($r = 0.42$, $p < 0.001$ and $r = 0.51$, $p < 0.001$, respectively), supporting the validity of the measures of perceived emotional expressions. Likewise, performance ratings by teachers and the outside expert were substantially correlated ($r = 0.68$, $p < 0.001$), attesting to the validity of teachers' ratings.

Analytical approach

We employed multi-level modeling to account for non-independence of observations (i.e., students are nested within teachers; Peugh, 2010). Given that our hypotheses are located at the lower (student) level and we were not interested in testing cross-level interactions, our sample effectively consisted of 102 observations at Level 1, which is more than adequate for reliably testing two-way interactions among continuous variables.

To minimize common method variance (e.g., correlations being inflated due to common-source bias; Podsakoff et al., 2003), we used students' perceptions of their teachers' emotional expressions to predict teachers' ratings of students' musical performance. In a series of multi-level models, we treated teachers' positive and negative emotional expressions, students' agreeableness and information-processing motivation, and their interactions as fixed factors predicting students' performance, while adding a random intercept for teacher (Peugh, 2010). Predictor variables were grand-mean centered before computing interaction terms (Kreft et al., 1995).

In light of our hypotheses and to prevent issues with statistical power, we performed separate analyses testing the predicted two-way interactions between teachers' positive versus negative emotional expressions on the one hand and students' agreeableness versus information-processing motivation on the other hand. (Exploratory analyses revealed no significant higher-order interactions.) In addition to the conventional reporting of unstandardized regression coefficients (*B*s), standard errors (*SE*s), *t* values, *p* values, and confidence intervals (CIs) around the unstandardized coefficients, we report standardized regression coefficients (βs) as indices of effect size (Lorah, 2018).

Hypotheses testing

Teachers' positive emotional expressions and students' agreeableness

Multi-level analysis produced a significant main effect of positive emotional expression, $B = 0.348$ ($SE = 0.151$), $t(92.620) = 2.302$, $p = 0.024$, 95% CI [0.048, 0.647], $\beta = 0.25$, no main effect of agreeableness, $B = 0.038$ ($SE = 0.184$), $t(85.802) = 0.206$, $p = 0.837$, 95% CI [-0.329, 0.405], $\beta = 0.02$, and critically, a significant interaction, $B = 0.520$ ($SE = 0.189$), $t(84.336) = 2.758$, $p = 0.007$, 95% CI [0.145, 0.895], $\beta = 0.27$. The interaction pattern, shown in Fig. 1a, revealed that stronger positive emotional expressions of teachers were associated with better musical performance among students higher rather than lower on agreeableness.

Teachers' negative emotional expressions and students' agreeableness

We found a significant main effect of negative emotional expression, $B = -0.672$ ($SE = 0.166$), $t(92.999) = -4.051$, $p < 0.001$, 95%CI [−1.001, −0.342], $\beta = -0.41$, no main effect of agreeableness, $B = 0.123$ ($SE = 0.173$), $t(80.521) = 0.708$, $p = 0.481$, 95%CI [−0.222, 0.467], $\beta = 0.06$, and a significant interaction, $B = -0.497$ ($SE = 0.160$), $t(73.708) = -3.107$, $p = 0.003$, 95%CI

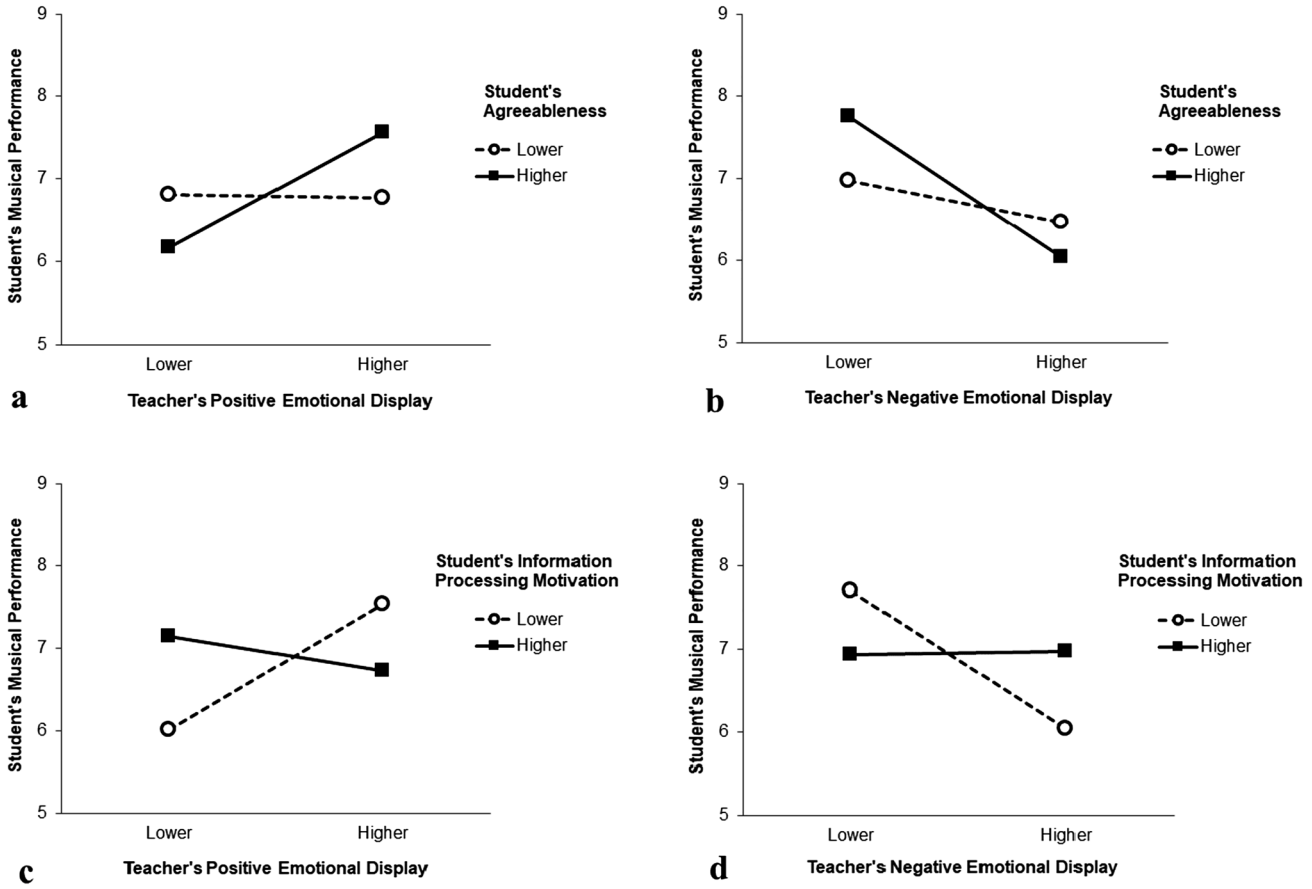

Fig. 1 Quality of students' musical performance as a function of music teachers' positive (left panels) versus negative (right panels) emotional expressions and students' agreeableness (top panels) and information processing motivation (bottom panels). Effects are plotted at − 1 SD ("lower") and + 1 SD ("higher") from the mean of the respective variables

[− 0.816, − 0.178], β = − 0.22. As seen in Fig. 1b, stronger negative emotional expressions of teachers were linked to worse musical performance among students higher rather than lower on agreeableness.

Teachers' positive emotional expressions and students' information processing

There was no significant main effect of positive emotional expression, $B = 0.278$ ($SE = 0.151$), $t(88.103) = 1.846$, $p = 0.068$, 95%CI [− 0.021, 0.578], β = 0.20, no main effect of information-processing motivation, $B = 0.073$ ($SE = 0.127$), $t(90.919) = 0.577$, $p = 0.565$, 95%CI [− 0.178, 0.324], β = 0.06, but importantly, a significant interaction, $B = -0.455$ ($SE = 0.144$), $t(90.109) = -3.167$, $p = 0.002$, 95%CI [− 0.741, − 0.170], β = − 0.35. As depicted in Fig. 1c, stronger positive emotional expressions were related to better performance among students with lower rather than higher information-processing motivation.

Teachers' negative emotional expressions and students' information processing

We observed a significant main effect of negative emotional expression, $B = -0.484$ ($SE = 0.185$), $t(79.895) = -2.613$, $p = 0.011$, 95%CI [− 0.853, − 0.115], β = − 0.29, no main effect of information-processing motivation, $B = 0.038$ ($SE = 0.122$), $t(81.804) = 0.314$, $p = 0.754$, 95%CI [− 0.205, 0.282], β = 0.03, and critically, a significant interaction, $B = 0.470$ ($SE = 0.175$), $t(78.977) = 2.691$, $p = 0.009$, 95%CI [0.122, 0.818], β = 0.31. As shown in Fig. 1d, stronger negative emotional expressions were associated with better performance among students with higher rather than lower information-processing motivation.

Discussion

We investigated how teachers' emotional expressions shape students' performance. We obtained evidence that performance effects of teachers' emotional expressions are

qualified by students' personalities. Specifically, stronger positive emotional expressions of teachers were associated with better performance among students higher on agreeableness and lower on information-processing motivation, whereas stronger negative emotional expressions of teachers were associated with better performance among students lower on agreeableness and higher on information-processing motivation.

Theoretical and practical implications

Emotional expressions have been conceptualized as carriers of feedback (Cacioppo & Gardner, 1999; Keltner & Haidt, 1999; Van Kleef, 2016), but their effects on performance are poorly understood. Our finding that the performance consequences of teachers' emotional expressions depend on students' personality make-up helps reconcile apparently inconsistent findings from previous studies, some of which suggested that positive emotional expressions facilitate motivation and performance, whereas others suggested that negative emotional expressions engender greater motivational and performance gains. Our finding also resonates with a key insight from the feedback literature, namely that the effectiveness of different types of feedback depends on the match between feedback and receiver (Kluger & DeNisi, 1996). Forging new theoretical links between feedback theory and affective science, our data show that positive and negative emotional expressions are not inherently beneficial or detrimental for learners' performance; rather, their consequences depend on their match with learners' personalities.

Our hypotheses were informed by EASI theory (Van Kleef, 2009, 2016). Previous support for this theory stemmed almost exclusively from research in carefully controlled yet contrived laboratory settings (Van Kleef & Côté, 2022). The current research provides unique support for the theory in the context of meaningful ongoing interactions and is the first to incorporate measures of both theoretical moderators in a single study. The findings indicate that EASI theory can be used to inform hypotheses about the effects of emotional expressions in real-world settings. Together with a growing body of evidence from experimental studies in different contexts, the current findings emphasize the importance of considering contingencies of the social effects of emotional expressions.

On a practical note, the current findings point to contingencies of the effectiveness of positive and negative emotional feedback that teachers and other feedback providers may want to keep in mind when deciding how to deliver feedback. First, our data suggest it is important to consider individual differences in the motivation to engage in thorough information processing as well as situational factors that are known to affect momentary information-processing depth, such as time pressure, cognitive load, and fatigue (Fiske & Dépret, 1996; Kruglanski & Webster, 1996). For instance, fatigue may diminish a student's ability to constructively engage with emotionally-charged feedback, such as anger expressions, thereby limiting their effectiveness. Second, our data suggest it is important to consider the perceived appropriateness of emotional feedback, as shaped by individual differences in agreeableness as well as situational factors such as the intensity (Cheshin et al., 2018) and authenticity (Côté et al., 2013) of emotional expressions and cultural (Kitayama et al., 2006) and organizational (Rafaeli & Sutton, 1987) "display rules" and expectations. Feedback that aligns with the emotional atmosphere of the learning environment is more likely to be deemed appropriate by students, thereby facilitating a more receptive learning experience. Educators and mentors should therefore strive to be sensitive to the context in which they are providing feedback so as to optimize its educational impact.

Strengths, limitations, and future directions

A downside of naturalistic correlational studies such as the present one is that they do not afford causal conclusions. This was a deliberate sacrifice, considering that EASI theory has already been supported by dozens of experimental studies, whereas evidence from naturalistic social interactions is very sparse (Van Kleef & Côté, 2022). We attempted to alleviate concerns about reverse causality by operationalizing our theoretical moderators via stable individual differences, and preempted common method bias by collecting data from different sources (students, their teachers, and other teachers) at different timepoints (Podsakoff et al., 2003). These design choices make alternative interpretations involving reverse causality less plausible. For instance, if we had measured information processing motivation as a state variable after the teaching sessions, students' responses on this measure could have been affected by what happened during those sessions (e.g., teachers' emotional expressions or students' performance), which would have rendered the interpretation of our data more uncertain. Given that we measured the theoretical moderators as stable individual differences on an earlier timepoint, such alternative interpretations are implausible.

Nevertheless, our data do not allow us to rule out that teachers' emotions were shaped by students' performance, rather than the other way around (see e.g., Frenzel et al., 2020). Given that students' performance is relevant to teachers, we would indeed expect students' performance to be a trigger of teachers' emotions, as noted in the Introduction. Theoretically, teachers' emotions and students' performance may thus be bidirectionally related (Butler, 1994). Even though students' trait agreeableness and

information-processing motivation cannot have been influenced by their musical performance or the teachers' emotional expressions (given that the traits were measured one week prior to the teaching sessions), it is still possible that teachers took students' personalities into account when deciding whether and how to express their emotions. For instance, experienced and emotionally intelligent teachers may be more careful in expressing anger at students who are higher rather than lower on agreeableness. Future research could employ experimental designs to obtain causal evidence for the interactive effects of teachers' emotional expressions and students' personalities on students' musical performance.

Another limitation of the current study is that it provides no insight into how teachers expressed their emotions. The fact that students' perceptions of their teachers' emotions were significantly correlated with teachers' self-reported emotional experiences suggests that teachers' emotions were accurately perceived by students, but it is unclear which expressive cues informed students' perceptions. In face-to-face interactions, emotions can be communicated via facial displays, vocal expressions, bodily postures, and/or in words. EASI theory holds that the social effects of emotions are similar in direction (though not necessarily magnitude) regardless of the expressive modality (Van Kleef, 2017), because the information that is provided through each of these modalities is similar (e.g., an angry face, voice, posture, or words all communicate anger). This would imply that teachers' emotional expressions influence students' performance in similar directions regardless of how the emotions are emitted, even though effects may be stronger through some modalities than through others. Future studies could compare the effects of facial, vocal, postural, and verbal expressions of emotion to shed more light on this issue.

Although our study benefited from uniformity in environmental and educational factors by focusing on a single music school, this approach may limit the applicability of our results to other educational settings. The reliance on data from one educational environment raises questions about the generalizability of our findings to other settings, as they may not reflect the diversity of pedagogical strategies and student experiences that may be present across different schools. Additionally, institutional practices (e.g., teaching methods) specific to this school and/or characteristics of its students (e.g., in terms of socioeconomic background) might limit the generalizability of our results to other educational settings. To enhance the external validity of future studies, a more diverse array of schools should be included to mitigate the influence of such idiosyncratic factors and to ensure that the findings are more representative of the wider student population.

Finally, the conclusions that can be drawn from this study may be limited by the fact that the study was conducted in a Western, individualistic context (The Netherlands). Evidence suggests that negative feedback is more frequently used in teaching—and more readily accepted—in collectivistic than in individualistic cultures (Markus & Kitayama, 1991). It is conceivable, therefore, that students in more collectivistic cultures generally perform better with an angry teacher than students in more individualistic cultures. At the same time, however, other research indicates that expressions of anger outside the teaching context are deemed relatively more acceptable by individuals with Western rather than Eastern cultural backgrounds (Adam et al., 2010), which would lead to the opposite prediction. These apparently inconsistent possibilities point to an interesting avenue for future research, which could also consider interactions between personality and culture.

Conclusion

Awaiting future research, we conclude that the effects of teachers' emotional expressions on students' performance depend on students' personality make-up. Reconciling conflicting theoretical perspectives and past findings on the helpfulness versus harmfulness of positive versus negative emotional expressions in teaching, our data demonstrate that the consequences of feedback providers' emotional expressions are modulated by individual differences between students in theoretically meaningful ways. In particular, students' musical performance may flourish or suffer depending on whether the emotional tone their teachers strike matches their personality. As the French proverb so aptly expresses, "c'est le ton qui fait la musique" (it's the tone that makes the music).

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Author contributions GvK developed the study with input from ML and ES. ML collected the data under supervision of GvK and ES. GvK, ML and ES analyzed the data. GvK wrote the report and ES provided feedback and revisions.

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Data availability The data reported in this manuscript are not publicly available due to privacy restrictions. They will be uploaded on a secure data repository to which scholars will be given access upon motivated request.

Declarations

Conflict of interest On behalf of all authors, the corresponding author states that there is no conflict of interest.

Ethical approval The study was approved by the Ethics Review Board of the Department of Psychology at the University of Amsterdam (project number 2013-SP-2860) and performed to ethical standards as laid down in the 1964 Declaration of Helsinki. All participants provided informed consent. The study reported in this manuscript was not preregistered.

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