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Breadth of emotion vocabulary in early adolescence

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Studies of emotion vocabulary and understanding typically focus on early childhood. Yet, emotion abilities continue to develop into adolescence, making it an important and underinvestigated area of research. This study presents evidence that adolescents' emotion vocabulary undergoes active development, becomes more broad and sophisticated, varies by gender, and is not captured adequately by recognition-based approaches. Adolescents were asked to generate emotion words for five emotion categories—happy, relaxed, angry, sad, and nervous. Responses included emotion words (e.g., joyous) and nonemotion terms such as metaphors (e.g., boiling), social experiences (e.g., underappreciated), and personality traits (e.g., shy). Girls generated significantly more responses than boys. Older adolescents generated significantly more emotion words (e.g., describing someone who is happy as joyful, exuberant or ecstatic), while younger adolescents produced more nonemotion responses (e.g., describing someone who is happy as smiley, friendly, or full of life). Students' grade, total number of responses they produced, and performance on the recognition test of emotion understanding predicted their target emotion vocabulary.

The development of emotion vocabulary and understanding begins in early childhood and continues across the lifespan. Emotion vocabulary and understanding have been extensively studied in young children (e.g., Bretherton, Fritz, & Zahn-Waxler, 1986; Ridgeway, Waters, & Kuczaj, 1985; Wellman, Harris, Banerjee, & Sinclair, 1995). While it has been suggested that emotion vocabulary continues to increase in complexity, breadth, and sophistication through later childhood and adolescence (Buckley & Saarni, 2006; Saarni, Mumme, & Campos, 1998), its development beyond early childhood remains under-investigated. The present study describes the development and the breadth of emotion vocabulary among early adolescents for five emotion categories and examines gender differences.

Emotion vocabulary is key to understanding one's own and others' emotions. The vast vocabulary of emotions has been examined to create a taxonomy of emotion lexicon (Doost, Moradi, Taghavi, Yule, & Dalgleish, 1999; Storm & Storm, 1987). Language of emotion has been construed as a tool to explore and make meaning of emotional states and a means of interpersonal communication (Bamberg, 1997; Saarni, Mumme, & Campos, 1998) as it allows to reflect on emotional states by correctly identifying and properly labeling the feelings experienced. Among core skills forming the construct of emotional competence, Saarni (1999) included emotion knowledge comprised of emotion vocabulary and expressivity. Use of emotion lexicon is impaired in some people who struggle to identify and describe their emotions – the problem termed "alexithymia" (Sifneos, 1973; Mattila, Salminen, Nummi, & Joukamaa, 2006). Difficulty with identifying one's emotions in adolescents is related to negative affect and deficiencies in socio-emotional functioning (Ciarrochi, Heaven, & Supavadeeprasit, 2008).

The ability to properly label emotions impacts other emotion related skills, such as emotion comprehension and regulation. As an application of emotion vocabulary, emotion

understanding is an important component of socio-emotional development, playing a role both in social (e.g., Denham, Blair, DeMulder, Levitas, Sawyer, Auerbach–Major, & Queenan, 2003; Trentacosta, & Fine, 2010) and academic competence (e.g., Izard, Fine, Schultz, Mostow, Ackerman, & Youngstrom, 2001; Márquez, Martín, & Brackett, 2006). Among adolescents, emotion understanding skills are related to higher well-being and higher-quality relationships (Mavroveli, Petrides, Rieffe, & Bakker, 2007; Rivers, Brackett, Reyes, Mayer, Caruso, & Salovey, 2012) and fewer unhealthy behaviors such as tobacco and alcohol consumption (Brackett, Mayer, & Warner, 2004; Trinidad & Johnson, 2002).

Research on the development of emotion vocabulary has focused primarily on younger children's understanding of discrete emotions (e.g., happiness is well understood in preschool and guilt in middle childhood). Emotion categories are acquired gradually and change over the course of childhood until children's emotion categories approximate adults' (Widen & Russell, 2013; Widen, Pochedly, & Russell, 2015). Children's initial emotion concepts are broad and valence-based (e.g., feeling good or bad). These initial concepts are gradually differentiated as children link the components (e.g., causes, consequences, facial expressions, vocalizations, behaviors, etc.) of each specific emotion, ultimately resulting in more discrete, complex, and adult-like concepts.

Some emotion concepts are well-developed by the end of the preschool years (e.g., happiness, sadness, anger), but others (e.g., fear, surprise, disgust, guilt, pride) are not fully acquired until middle childhood or adolescence (Herba, Landau, Russell, Ecker, & Phillips, 2006; Montirosso, Peverelli, Frigerio, Crespi, & Borgatti, 2010; Widen, Pochedly, & Russell, 2015; Widen & Russell, 2010). By adolescence, children perform well on the tasks that ask them to identify and label the emotions presented through facial expressions or situational

vignettes. However, the majority of research on adolescents' emotion understanding has focused on their labeling of facial expressions and has been used primarily as comparison groups for clinical samples (Fairchild, Van Goozen, Calder, Stollery, & Goodyer, 2009; Grossman, & Tager-Flusberg, 2008; Walker, & Leister, 1994). A better test of adolescents' emotion understanding is a more generative one that asks them to produce labels within an emotion family (e.g., synonyms for *happy*, *sad*, etc.).

Evidence suggests that emotion knowledge, including emotion vocabulary, continues to develop into adolescence. It is, however, an open theoretical and methodological question at what point in development adolescents perform at the same levels as adults on measures of emotion vocabulary. In a study using a recognition-based test of emotion understanding (but not specifically emotion vocabulary as such), 12- and 13-year-old participants had higher test scores than 10- and 11-year-olds (Rivers et al., 2012). The mean scores of older adolescents matched the scores obtained in the adult sample using the same measure (e.g., Brackett & Mayer, 2003), suggesting that older adolescents might perform at adult-like levels on this measure. The data from studies of emotion vocabulary specifically is inconclusive. For example, Doost and colleagues (1999) found an age advantage for children over 14 years old as compared to younger children, but O'Kearney and Dadds (2004) did not find age related differences in their sample of 12-18 year old students, as well as Whissell and Nicholson (1991) did not find an increase in emotion vocabulary production from the 4th to 8th graders.

There are two primary methods used to study emotion vocabulary: prompted recognition and label generation. One example of the recognition approach is the emotion understanding scale from the Mayer, Salovey, and Caruso Emotional Intelligence Test - Youth Version (MSCEIT-YV; Mayer, Salovey, & Caruso, 2004) which measures the ability to accurately

understand and label basic and complex emotions (emotion vocabulary portion of the test; e.g., "When you feel pleased and content, you feel___ "; with response options: brave, pride, happiness, surprise, and challenge). Tests like the Levels of Emotional Awareness Scale for Children (LEAS-C; Bajgar, Ciarrochi, Lane, & Deane, 2005; Lane, Quinlan, Schwartz, Walker, & Zeitlin, 1990) exemplify the label generation approach. The test presents children with emotion eliciting vignettes and asks them to describe the emotions experienced by the story protagonists using two prompting questions: 'How would you feel?', and, 'How would the other person feel?' On the LEAS-C, emotion understanding scores and the total emotion labels generated were moderately correlated (Bajgar et al., 2005). While each of the methods presents unique advantages (for a review, see Zeman, Klimes-Dougan, Cassano, & Adrian, 2007), standardized tests using recognition approaches limit our ability to investigate the breadth of the emotion vocabulary in full detail.

Several studies specifically examined the breadth of emotion vocabulary among adolescents using a label generation approach (Doost, Moradi, Taghavi, Yule, & Dalgleish, 1999; O'Kearney & Dadds, 2004; Whissell & Nicholson, 1991). In one study, a small sample of 5- to13-year-old children were individually interviewed to test their emotion label production for seven target emotion categories – *happy, sad, afraid, mad, comfortable, proud,* and *guilty* (Whissell & Nicholson, 1991). Doost and colleagues (1999) asked 9-16 year olds to generate emotion words describing three categories – *happy*, *sad*, and *scary*. In both studies, older students produced more emotion labels suggesting that emotion vocabularies continue to increase at least through mid-adolescence. The differences across emotion categories were inconsistent: on the one hand, adolescents generated the most emotion terms for *happy* and *sad* categories (Whissell & Nicholson, 1991), while no category-level differences in total label

production were found for *happy*, *sad*, and *scary* (Doost et al., 1999) or for *anger* and *fear* categories (O'Kearney & Dadds, 2004).

There is broad agreement about pronounced gender differences in emotional development (Brody, 1985). Studies with adults and adolescents alike reported female advantage in emotional complexity and emotion identification skills (Bajgar et al., 2005; Barrett, Lane, Sechrest, & Schwartz, 2000; Ciarrochi, Hynes, & Crittenden, 2005; Mattila et al., 2006). The nature of these differences is proposed to be embedded in contextual factors, such as gendered stereotypes in child rearing practices, sociocultural pressures, and peer socialization (Aldrich & Tenenbaum, 2006; Stapley & Haviland, 1989).

For instance, Aldrich and Tenenbaum (2006) found that although girls overall used more emotion words than boys in conversations with their parents, there were no gender differences in references to *anger*, girls used more descriptors for *frustration*, and boys used more labels for *sadness* when talking to their fathers. However, this finding is in direct contradiction to the results regarding gender differences for *sadness* in other studies (Doost et al., 1999; O'Kearney & Dadds, 2004). Potential gender differences in emotion vocabulary may also be dependent on the type of measure used. Studies using the recognition approach consistently find an advantage for girls (e.g., Rivers et al., 2011), while studies using the label generation method tend to find only category specific advantages (Doost et al., 1999; O'Kearney & Dadds, 2004; Whissell & Nicholson, 1991).

Research accounts of adolescents' emotion vocabulary to date were limited in scope to several emotion categories and produced inconsistent results regarding age and gender differences. We expanded previous work by examining adolescents' emotion vocabulary for a set of five emotion categories – *happy, relaxed, angry, sad,* and *nervous*. We selected the target

emotion categories to be strategically distributed across the core dimensions of affect, arousal (high energy versus low energy/sleepiness) and valence (pleasant versus unpleasant feelings), which are based on the circumplex model of affect (Russell, 1980; Russell, Weiss, & Mendelsohn, 1989). Contrasting two core elements of affect, we chose happiness as an example of high arousal and high pleasantness, relaxation as an example of low arousal and high pleasantness, sadness as an example of low arousal and low pleasantness, anger and nervousness as two different examples of high arousal and low pleasantness. We decided to include two emotion labels in the latter as the positive-low arousal-high quadrant is an important though unaddressed area in developmental research on emotion understanding. While studying more complex emotional states (like pride or embarrassment) using the label generation approach would be advantageous and highly informative, we chose to focus on basic but representative emotions to probe adolescents' label-generation ability with reasonably more understandable emotion states.

The study's goals were to describe the nature and breadth of 13-17 year-old (5^{th}-8^{th} grade) adolescents' vocabulary for these target emotions, examine age and gender differences, and test the relationship between the established ability measure of emotion understanding, which uses the recognition approach, and the label generation measure. We hypothesized that emotion vocabulary would become more sophisticated and specific with age (e.g., evident in the use of single and correct emotion labels) and expected to see a gender advantage for girls. We also predicted a significant and moderate correlation between adolescents' performance on label generation and the recognition measure of emotion.

Method

Participants

Participants were students in 5th-8th grades (*N* = 230, 93 males) at a private middle school in California, USA; 49 students in 5th grade, 68 in 6th grade, 53 in 7th grade, and 60 in 8th grade. No further demographic information was available at the time of data collection. We therefore used grade to examine maturational changes in emotion vocabulary. We also combined the 5th and 6th graders and the 7th and 8th graders into two groups: younger adolescents (*N* = 116; 52 males) and older adolescents (*N* = 114; 41 males).

Materials and Procedure

Students were tested in their classrooms using paper-and-pencil questionnaires. Classroom teachers who administered the measures ensured that students worked individually.

Emotion Vocabulary: Label Generation Task. Students completed an open-ended questionnaire with the following instructions: "List all of the feeling words that come to mind that could describe someone who is feeling *happy*. Think of feelings (a range of feeling words) that describe someone who is either a little or very happy." The same instruction was provided for each of the other four target emotional states: *relaxed, angry, sad,* and *nervous*.

All responses to the label generation task were pulled into an alphabetized list, which yielded 1,472 unique terms. In addition to emotion words that clearly described one of the target emotions (e.g., responses such as *mad, frustrated,* or *furious* when asked about anger), there were also responses that were descriptors of closely related emotions (e.g., responses such as *proud* or *loved* when asked about happiness) and terms referring to conditions, activities, and expression of emotions (e.g., responses such as *lonely* or *crying* when asked about sadness).

To address this variety of responses, the coding was a two-step process (see Table 1). In step 1, we coded all responses that closely matched one of the five target categories (*happy, sad, angry, nervous, relaxed*) and five closely associated categories (*proud, surprised, embarrassed,*

disappointed, love; feelings of *love* and *pride*, for instance, are usually accompanied by happiness and thus can be emotion descriptors of a person who is feeling happy). We included these five primary emotion categories to explore deeper the range of emotion-specific responses produced by participants prior to identifying additional patterns in the data. Two coders were asked to assign each unique response to one of the target emotion categories (i.e., *happy, relaxed, angry, sad,* and *nervous*) or closely associated, primary emotion categories (i.e., *surprised, embarrassed, loved, proud,* and *disappointed*; see Table 1). The coders had 84% agreement (Cohen's Kappa value of .66) and the third coder resolved the disagreements; all coders were research assistants in psychology with experience working in an emotions lab.

Next, we examined responses that could not be reliably classified into specific emotion categories. Thus, responses that were not reliably recognized as describing one of the target or associated emotion categories were coded with an additional set of categories in order to obtain a richer description of early adolescents' language for emotions. We omitted responses that merely repeated the target emotion words (e.g., *happy*), direct negations of target emotion words (e.g., *not happy*), and nonsensical responses (e.g., *hair cutty*). Closely related responses were treated as a single entry, including responses varying in intensity (e.g., *a little bit sad, very sad*), words with the same root (e.g., *apprehension* and *apprehensive*) and elaborated responses (e.g., *accepted* and *accepted for who I am*). When similar responses had different meanings, they were treated as separate entries. For instance, *bullied* and *bullying* remained as two separate responses, acknowledging the difference in meaning between someone who is a bully and someone who is being bullied.

In step 2, two raters assigned 814 unique responses that could not be coded in the first step into one of six mutually exclusive categories: physical reactions, social experiences,

personality traits, activities, metaphors, and other emotion words not accounted for at stage 1 coding (see Table 1). The categories were derived empirically based on exploratory coding of 16 student questionnaires randomly drawn from the sample (four from each grade level). For the first 20% of the sample the coders met in person to assign responses to the six categories through discussion, reaching the agreement of 84.4% (Cohen's Kappa value of .80). The coders then worked independently with the remaining responses, resolving all disagreements in a subsequent discussion. The final overall agreement for this exploratory layer of coding was 69.4% (Kappa .63).

Emotion Vocabulary: Recognition Task. Students completed the emotion understanding subscale of the MSCEIT-YV (Mayer, Salovey, & Caruso, 2004). The test assessed sophistication of emotion vocabulary, the ability to label emotions described in brief stories, and understanding of the causes of emotions (23 items). The first task asked respondents to select the best emotion term to describe an experience (e.g., "When you worry that something dangerous or awful is about to happen, you feel___"; response options: sad, envy, fear, frustration, and jealousy). The second task measured the ability to recognize the causes and consequences of emotions (e.g., "The brother of Ali's friend was injured in a car accident. Ali felt ___ his friend"; response options: sorry for, guilty for, pleased for, angry for, and curious about). The third task assessed participants' understanding of complex or blended emotions (e.g., "Aggressiveness feels most like which two emotions?; response options: contempt and joy, anger and anticipation, anger and surprise, and surprise and sadness). The test has been validated for use with children aged 10 to 17 years (Rivers et al., 2012). The scoring algorithm used to calculate the correct answers was based on judgments by a panel of emotion experts and was additionally reviewed by independent

doctoral-level psychologists (see Rivers et al., 2012, for full description of the expert scoring procedures).

Results

First, we describe the distribution of generated responses across coding categories. We then examine gender and grade differences using independent samples t-tests and non-parametric tests. We report overall and emotion category level differences in total generated responses, as well as target emotion labels, associated emotion labels, and non-emotion labels. Further, we compare students' performance on the label generation task to their scores on the emotion understanding subscale of the MSCEIT-YV using Pearson's correlation and paired samples t-test analyses. Finally, we present a series of linear regression analyses exploring the predictive power of gender, grade, total number of generated responses, and the standardized score on emotion understanding MSCEIT-YV measure on generation of target emotion responses.

Breadth of early adolescents' emotion vocabulary

We assessed the breadth of early adolescents' emotion vocabulary in each of five emotion categories – *happy*, *relaxed*, *angry*, *sad*, and *nervous*. Participants collectively produced 1,472 unique responses (M = 32.03, SD = 11.72, range: 9-79): 194 were synonyms for one of the target emotion categories (M = 12.34, SD = 4.72; range: 4-26), 224 were synonyms for one of the ten associated emotion categories (M = 16.10, SD = 5.52, range: 5-33), and 814 pertained to one of the six non-emotion responses *(*M = 12.50, SD = 8.11, range: 0-50; see Table 1). The non-emotion categories collectively accounted for 55% of the total unique exemplary responses generated.

On average, adolescents generated 6.94 responses for *happy* (SD = 2.84), 6.87 for *angry* (SD = 2.79), 6.45 for *sad* (SD = 3.20), 6.02 for *relaxed* (SD = 2.45), and 5.74 for *nervous* (SD =

2.97) categories. Target emotion category responses included: 3.75 responses for *happy* (*SD* = 1.98), 2.83 responses for *angry* (*SD* = 1.48), 2.08 labels for *nervous* (*SD* = 1.36), 1.94 for *relaxed* (*SD* = 1.23), and 1.73 for *sad* (*SD* = 1.36). Non-emotion category responses averaged to 1.64 (*SD* = 2.53) responses for metaphors, 1.93 (*SD* = 2.26) for physical reactions, 2.39 (*SD* = 3.56) for social experiences, 2.67 (*SD* = 2.01) for personality traits, and .35 (*SD* = .81) for activities categories.

Additionally, we created composite variables for low arousal (*sad* and *relaxed*) and high arousal (*happy*, *angry*, and *nervous*) responses to examine overall, gender and grade differences in terms of the arousal dimension of the circumplex model of affect. A series of paired samples t-tests revealed that adolescents generated significantly more responses for high arousal categories (*happy*, *angry*, and *nervous*) as compared to low arousal categories (*relaxed* and *sad*) for total responses: $t(220) = -2.80$, $p = .006$; target emotion responses: $t(229) = -13.648$, $p < .001$; associated emotion responses: $t(229) = -7.89$, $p < .001$; with the reverse pattern for non-emotion responses: $t(229) = 4.05$, $p < .001$. These differences stayed significant after removing the responses for *happy* category from the high arousal composite as the only distinctly positive valence category; target emotion: $t(229) = -7.92$, $p < .003$; associated emotion: $t(229) = -2.83$, $p = .005$; non-emotion: $t(229) = 2.33$, $p = .02$), however, the total responses generated no longer significantly differed between low and high arousal ($t(229) = -.512$, $p = .609$), indicating that responses generated for *happy* category drove the initial effect.

Gender differences in emotion vocabulary

A series of independent sample *t*-tests examined gender differences in emotion vocabulary. As illustrated by Figure 1, girls generated significantly more responses across all coding categories than boys: total responses ($t(201.28) = -3.67$, $p < .001$), target emotion labels

($t(228) = -3.02$, $p = .003$), associated emotion labels ($t(228) = -3.42$, $p < .001$), and non-emotion responses ($t(214.52) = -3.47$, $p < .001$). These overall results remained after applying a Bonferroni correction for multiple comparisons (at the adjusted alpha level of .01). In addition, the non-parametric independent samples Mann-Whitney U test provided convergent results across all coding categories: total responses ($U = 4434{,}5$, $p < .001$), target emotion labels ($U = 5075$, $p = .009$), associated emotion labels ($U = 4723{,}5$, $p < .001$), and non-emotion responses ($U = 4680$, $p < .001$).

Girls produced more total responses for four out of five emotion categories (*happy*, *angry*, *sad*, and *nervous*; see Table 2), more target emotion labels for *happy*, *sad*, and *nervous* categories, associated emotion labels for *happy*, *relaxed*, *sad*, and *nervous* categories, and non-emotion labels for *happy*, *angry*, *sad*, and *nervous* categories. Using the adjusted alpha level of .003 following the Bonferroni correction, girls produced significantly more total responses (but not target or associated emotion responses) for *happy*, *angry*, *sad*, and *nervous* categories, and more non-emotion responses for *happy* only. Analyses based on the emotion circumplex model's arousal dimension mirrored the overall pattern of results. However, the non-parametric independent samples Mann-Whitney U test returned somewhat divergent results for emotion categories gender differences; see Table 2 for details.

Girls also generated more total responses for each of the non-emotion categories (metaphors, physical reactions, social experiences, personality traits, and activities), but the only statistically significant difference was for the physical reaction category ($M_{girls} = 2.35$ ($SD = 2.42$), $M_{boys} = 1.3$ ($SD = 1.84$); $t(228) = 3.5$, $p < .001$).

Grade differences in emotion vocabulary

Independent sample *t*-tests also tested age differences by using the composite grade variable: we combined the 5th and 6th graders and the 7th and 8th graders into two groups, younger adolescents (*N* = 116; 52 males) and older adolescents (*N* = 114; 41 males). (Note: We chose to perform these analyses instead of the ANOVA given unequal numbers of participants in each of the four grades. In addition, we performed linear regression analyses (reported below) using grade as a continuous variable as we sampled continuously from 5th through 8th grade).

Older adolescents produced significantly more target emotion responses than younger adolescents, $t(228) = -4.12$, $p < .001$. This was also true for composite low and high arousal target emotion category responses (see Table 3). The opposite was true for non-emotion responses: younger adolescents produced significantly more responses than older adolescents, $t(226.69) = 2.54$, $p < .01$. The differences in the total generated responses were not significant (see Figure 2a). These results remained after applying a Bonferroni correction for multiple comparisons (at the adjusted alpha level of .01). In addition, the non-parametric independent samples Mann-Whitney U test also showed significant differences in target emotion responses ($U = 4758.5$, $p < .001$) and non-emotion responses ($U = 5137$, $p = .003$). The developmental trajectory across coding categories for 5-8th graders is plotted in Figure 2b.

Older adolescents produced more target emotion responses for *happy*, *angry*, and *sad* emotions and more associated emotion responses in the *angry* emotion category. In turn, across non-emotion categories, younger adolescents produced more responses for *happy*, *relaxed*, and *sad* categories. Following the Bonferroni correction, at the adjusted alpha level of .003, there were several statistically significant category-level grade differences: for *angry* and *sad* target emotion responses, *angry* associated emotion responses, and *happy* non-emotion responses. The

non-parametric independent samples Mann-Whitney U test returned convergent results for grade differences across emotion categories (see Table 3).

Finally, for non-emotion categories of responses, adolescents in 7th and 8th grades generated significantly less responses in social experiences category (M = 1.22, SD = 2.10) as compared to students in 5th and 6th grades (M = 3.51, SD = 4.26), $t(228) = 5.15$, $p < .001$. All other grade comparisons for non-emotion categories were not significant.

Comparing emotion label generation and recognition tasks

Next, we looked at students' responses on the emotion understanding subscale of the MSCEIT-YV and compared them to those on the label generation task. There were significant correlations between the scores on the emotion understanding subscale of the MSCEIT-YV and both target emotion responses (r = .23, $p < .001$) and associated emotion responses (r = .18, p = .007), but not with total non-emotion responses (r = -.06, p = .372). Furthermore, the correlation with the total number of generated responses was not statistically significant, r = .05, p = .49 (which is in contrast to the correlation with target emotion responses, where we found a moderate, r = .39, $p < .001$). When analyzed separately for each emotion category, we found a significant positive correlation of the emotion understanding subscale of the MSCEIT-YV with target emotion responses generated for *happy* (r = .17, p = .014), *angry* (r = .25, $p < .001$), and *nervous* (r = .16, p = .017) categories, as well as the composite high arousal target responses (r = .25, $p < .001$, being the same both with and without the *happy* category included in the composite).

The pattern of gender and grade differences on the MSCEIT-YV reflected the differences in label generation: girls had significantly higher scores than boys, $t(217) = -2.59$, p = .01, while younger adolescents and older adolescents did not differ significantly, $t(196.73) = -.87$, p = .388.

However, the non-parametric Mann-Whitney U test did not support the statistically significant result for gender differences (U = 4855, p = .069).

Regression analyses

A series of linear regression models were fit to examine the relationship between our main outcome variable, the total number of generated target emotion responses, and predictor variables: gender, grade, total number of responses generated, and scores on emotion understanding subscale of the MSCEIT-YV (see Table 4). To perform these analyses, we used grade as a continuous variable for students from 5-8th grades. We performed regression diagnostics for each of the models to ensure all regression assumption were met.

First, two simple linear regression models were fit to examine the individual effects of gender and grade on emotion vocabulary. Each of the factors independently predicted differences in target emotion vocabulary (gender: $t(228) = -3.02$, $p = .003$, Model 1; grade: $t(228) = 5.48$, $p < .001$, Model 2), though the gender alone only accounted for 4% of variability, while the grade accounted for 12%. To control for additional factors affecting the dependent variable, a multiple linear regression model was fit with gender, grade, total number of generated responses, and MSCEIT-YV score as predictors of performance on the label generation task (Model 3). The model explained 32% of variability in generating target emotion responses. The inclusion of additional control variables into the model eliminated the statistically significant effect of the gender variable. The remaining predictors included in this controlled model were statistically significant: grade, $t(214) = 5.07$, $p < .001$, total generated responses, $t(214) = 6.62$, $p < .001$, and emotion understanding subscale of the MSCEIT-YV, $t(214) = 2.75$, $p = .006$. Having excluded the gender variable from the final model, in our final model (see Model 4), we were able to account for 31% of variability in the total number of target emotion responses generated, with

statistically significant effect of grade, $t(214) = 5.96$, $p < .001$, total generated responses, $t(214) = 7.08$, $p < .001$, and emotion understanding subscale of the MSCEIT-YV, $t(214) = 3.00$, $p = .003$.

Additionally, to further understand the effect of independent variables of grade and total generated responses on emotion skills, we ran a regression analysis with the MSCIET-YV emotion understanding scores as a dependent variable. Unlike in Model 4 (see Table 4), where grade and total generated responses both predicted performance on the label generation task, here these factors did not predict higher scores on the standardized emotion understanding task. In this multiple regression model ($R^2 = .06$, $F(3,215) = 4.41$, $p = .005$), we found no effect of grade ($\beta = .38$, $t(215) = .59$, $p = .556$), no effect of total responses generated ($\beta = -.04$, $t(215) = -.56$, $p = .577$), but only a predictive effect of target emotion responses generated ($\beta = .49$, $t(215) = 3.00$, $p = .003$, 95% - CI = (0.167, 0.809).

Discussion

The current study investigated the breadth of early adolescents' emotion vocabulary for five emotion categories – *happy*, *sad*, *relaxed*, *nervous*, and *angry* – using an open-ended label generation approach. Adolescents' emotion vocabulary is broad and complex, including emotion labels for the target emotion categories (e.g., *joyful, exuberant* describing someone who is happy) and a variety of non-emotion responses such as physical reactions, social experiences, personality traits, specific activities, and metaphorical descriptors. Girls produced more responses than boys for most emotion categories. Older adolescents generated significantly more target emotion responses, while younger adolescents generated more non-emotion labels (e.g., *crazy*, *sleepy*, *shy*). Performance on an established recognition test of emotion understanding ability significantly correlated with the total number of target emotion labels overall and individually for *happy, angry,* and *nervous* emotion categories. Together, students' grade, total

number of responses produced, and scores on the emotion understanding ability test were significantly associated with emotion vocabulary as measured by the label generation approach.

The label generation task proved to be an effective method to gain rich data about adolescent emotion vocabulary. The sheer volume of unique emotion descriptors (1,472) produced by early adolescents is impressive, and in agreement with previous accounts. For instance, Whissell and Nicholson's (1991) participants (N = 74) produced a total of 1,169 labels for seven target emotions. In describing emotions, adolescents in our sample did not always discriminate between emotion labels (e.g., *angry*) and other related descriptors (e.g., *bullied*, *red hot*), the latter accounting for 55% of total responses generated.

Adolescents' emotion vocabulary showed signs of lacking precision and specificity. When asked to describe being *sad*, 28% of adolescents produced responses considered to describe *anger* and when asked to describe being *happy*, 23% of adolescents produced responses considered as better descriptors of *calm*. Furthermore, 18% of all non-emotion responses were coded as other emotion descriptors, as those did not strictly fit into ten primary emotion categories. This could point to the very nature of emotions, which are embedded in associated experiences, e.g., people tend to be happy when proud or bored when tired. For example, Whissell and Nicholson (1991) also found evidence that adolescents used associated emotions in describing a particular emotion: similar to the present study, *proud* was often mentioned when describing *happiness*. O'Kearney and Dadds (2004) reported that over 25% of adolescent-generated labels for *anger* and *fear* did not fit the target emotion categories, and included other descriptors, such as blends and combinations of emotion terms, general evaluative terms, situations, and behaviors. Analysis of written narratives in their study showed that besides producing descriptors of two target emotion categories – *anger* and *fear* – adolescents included

descriptors of being *sad*. The lack of precision in emotion vocabulary could also be attributed to the lack of maturity and emotional complexity (Lindquist & Barrett, 2008). In support of this explanation, the developmental trajectory findings in our study show gradual improvement of target emotion vocabulary.

Furthermore, this breadth of descriptors for emotions could be related to difficulties in distinguishing conceptually between emotion and non-emotion states (Shields, 1984). In our data, several groups of non-emotion descriptors were identified, which incorporated the breadth of experiences related to emotional states. Girls generated more responses describing physical reactions to emotion words (such as *antsy* or *aching*) than boys. This may indicate that girls are more sensitive to physical correlates of experiencing an emotion, though more research is needed to confirm that finding. Younger adolescents produced more responses describing social experiences (such as *abused* or *disrespected*) than older students. This may indicate that children in this age group, who are 5th and 6th graders in a state of transition to the high school environment, are more prone to map emotional experiences to social relationships, such as peer pressure and need to fit in (Buckley & Saarni, 2006). In addition, of all non-emotion categories identified, the most of unique exemplars of responses students collectively produced were coded as metaphorical expressions, though no grade or gender differences were found for this category. It may be that metaphorical language allows expressing emotional states with more precision and personal meaning, tapping into the development of creativity in the domain of emotions (Ivcevic, Bazhydai, Hoffmann, & Brackett, 2017). To test all these possibilities, future research should focus on identifying the motivation for selecting different kinds of non-emotion descriptors for emotional states.

Girls generated more responses and had broader emotion vocabularies than boys. This is unsurprising given that studies with adults frequently report female advantage in emotional complexity and differentiation in the language of emotions (e.g., Barrett, Lane, Sechrest, & Schwartz, 2000). Among adolescents, prior research using recognition-based tests of emotion vocabulary also consistently showed that girls outperform boys: girls were more likely to correctly recognize emotion labels on the MSCEIT-YV than were boys (Rivers et al., 2012); emotion understanding scores from the Levels of Emotional Awareness Scale for Children (LEAS-C) were higher for girls even after controlling for general verbal ability (Bajgar et al., 2005).

In our study, though lacking strong statistically significant results, girls generated more responses for all target emotion categories while prior studies using label generation methods tended to primarily find an advantage for girls in relation to descriptors of *sadness* (Doost et al., 1999, O'Kearney & Dadds, 2004). These inconsistencies between prior studies and the present study may be due to differences in the methods and coding approaches used. O'Kearney and Dadds (2004) examined only two emotion categories presented via vignettes, *anger* and *fear*, but also coded for *sadness*. In that study, *sadness* was not originally a target category and we would have coded references to *sadness* in response to *anger* or *fear* as associated emotion responses (and considered to reflect less sophisticated or precise understanding of the target categories). Besides asking for label generation, Doost et al. (1999) asked adolescents ten different questions for each of the three categories (*happy*, *sad,* and *scary*). Future research might clarify the gender differences in emotion vocabulary by directly comparing the tasks used by the different studies and developing a more uniform approach to coding.

Older adolescents generated significantly more target emotion responses, while younger adolescents used a lot of descriptors that are not specific emotion labels. Overall, however, grade was unrelated to the total number of responses, suggesting that both younger and older adolescents tend to use a similar number of terms to describe their emotions, but that older students develop more specific and accurate vocabulary of emotion words (e.g., single word emotion labels such as *joyful, elated* or *pleased* to describe happiness as opposed to *supported, cheeky* or *jumpy*). This finding is also consistent with prior reports of adolescents' emotion vocabulary using a label production method (Bajgar et al., 2005; O'Kearney & Dadds, 2004; Whissell & Nicholson, 1991), demonstrating that the emotion vocabulary continues to grow during early adolescence.

In terms of emotion category-level results, specifically the arousal dimension of the circumplex model of emotions (Russell, 1980; Russell, et al., 1989) that we chose to focus on, adolescents generated more total, target, and associated emotion responses for high arousal emotion categories (*happy*, *angry*, and *nervous*) as compared to low arousal emotion categories (*sad* and *relaxed*). The opposite was true for non-emotion responses, with low arousal categories eliciting more responses than high arousal ones. Girls generated more responses than boys for high arousal emotion across coding categories, including non-emotion category. Older students generated more responses for target high arousal emotion categories, and less non-emotion responses for high arousal emotions, which was consistent with the overall pattern of developmental differences. These findings came from exploratory analyses as we did not have a strong prediction regarding these differences. While high arousal emotional states are more salient, we did not find evidence that emotion vocabulary for these may develop earlier, instead, older students were able to produce more responses for these emotion categories. Future research

should try to probe these distinctions further, for example, by coding all generated responses, both emotion and non-emotion descriptors, on the dimensions of valence and arousal (e.g., using the affective norms; ANEW, Bradley & Lang, 1999), and investigating age and gender differences using this more nuanced approach.

Full understanding of the breadth of vocabulary is not available when using standardized multiple choice recognition-based tests (e.g., MSCEIT-YV, Mayer, Salovey, & Caruso, 2004; Emotion Comprehension Test; Cermele, Ackerman, & Izard, 1995). Nevertheless, in our study, adolescents with higher scores on emotion recognition test also showed more advanced emotion vocabulary. Both the label generation and the recognition-based approaches produced a similar pattern of gender and age differences, which is consistent with similar cross-methodological findings (Bajgar et al., 2005). In addition, we found a selective effect of grade and the total number of generated responses – which may be construed as a measure of overall verbal skill – on the generation task only, but not on the recognition test. Older students, those who generated more responses overall, and those who scored higher on the emotion understanding test were more likely to produce more target emotion responses. In contrast, when predicting MSCEIT-YV performance, we found no effect of grade, gender, or total generated responses, but only an effect of generating target emotion responses. These results suggest that while both measures are related, they are not tapping into exactly the same constructs, warranting the need for more nuanced understanding of vocabulary as a unique component of emotion understanding. Future research should disentangle whether these measures uniquely predict a range of socio-emotional and well-being outcomes known to be affected by emotion skills (e.g., Trentacosta & Fine, 2010).

There are several notable limitations of this study. While the open-ended emotion generation task led to a rich dataset, it presented challenges for designing a coding scheme. Strong theoretical model and additional empirical evidence that can help guide the understanding of such qualitative data is needed, especially for the large proportion of non-emotion descriptors. An interview approach might be more productive than surveys administered in a group setting, allowing students to provide detailed explanations and situate their responses in a meaningful context. To further investigate the developmental changes in emotion vocabulary, future research should include both middle school and high school students, as well as an adult comparison sample. Finally, the high achieving sample in an affluent school where these data were collected likely shows the upper limits of adolescents' emotion vocabulary, warranting studies of a more diverse population.

To uncover variations in emotion vocabulary development and gender differences, a broader range of emotion categories, including complex and blended emotions, should be included in future investigations. We chose five target primary emotion categories to cover each of the quadrants of the emotion circumplex. While data from additional emotion categories would have been valuable, we chose not to overburden participants at the initial session. Studies with multiple testing sessions could help overcome this methodological limitation.

Additionally, we did not control for students' general verbal ability. Prior research suggests young children's verbal skills are related to their emotion understanding (Cutting & Dunn, 1999; De Rosnay & Harris, 2002). To partially control for this factor, in our analyses we used a measure of total generated responses as a proxy for general verbal ability. We included this variable in our regression analyses to control for the predicted effects of grade and gender on target emotion vocabulary. We found an association between this measure and emotion

vocabulary as measured by label generation task, but not the scores on the standardized measure of emotion understanding. However, in our regression model, the number of all responses generated was not the strongest predictor of students' target emotion vocabulary. In addition, overall verbal ability is unlikely to explain emotion-category specific findings in the present study. Future studies should take care to control for general verbal skills to identify effects specific to emotion but not general vocabulary.

The current study extends our knowledge of adolescents' emotion vocabulary. We present evidence that adolescents' emotion vocabulary undergoes active development, becomes more broad and sophisticated, varies by gender, and is not captured adequately by recognition-based approaches. As compared to previous investigations, a larger sample and a more representative list of emotions (covering each quadrant of the emotion circumplex) enabled broader analyses of emotion vocabulary. We identified rich strategies early adolescents use to communicate emotions, including emotion labels (e.g., *calm*), associated emotion labels (e.g., *carefree*), and a large assortment of descriptors that do not specifically identify an emotion (most commonly metaphors, social experiences, and personality traits). While younger adolescents tend to use a wider variety of descriptors, older adolescents acquire a more precise emotion vocabulary.

Teaching emotion vocabulary is one of the central goals of social and emotional learning programs (SEL; Brackett & Rivers, 2014; Elbertson, Brackett, & Weissberg, 2009). For example, the Feeling Words curriculum is a multi-year, structured approach designed to teach sophisticated emotion understanding through a series of activities centered around a set of emotion words (e.g., *disappointed*, *discouraged*, *relieved*; Brackett, Rivers, Reyes, & Salovey, 2010; Rivers & Brackett, 2011). This approach is developed to be integrated into the language

arts curriculum and enhance students' interpretation and evaluation of the text, while developing a nuanced language of emotions. Although existing research offers support that SEL programs lead to improvements in academic success, greater relationship quality and fewer problem behaviors (Durlak, Weissberg, Dymnicki, Taylor & Shellinger, 2011; Rivers, et al., 2012), existing research does not offer insight into the changes in how students describe emotions, nor does it identify how changes in emotion vocabulary aid development of other social and emotional skills, such as managing emotions or showing empathy. The present research points to the rich ways in which early adolescents describe emotions and starts identifying age-related differences in the language of emotions that will be informative both to educators who aim to teach emotion skills and scholars who aim to enhance our understanding of emotional development.

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Table 1

Overview of the coding process and results

Coding category	Definition	Examples	Unique Exemplar Responses
	Step 1 Target Emotion Responses		
Happy	Feeling pleasure or enjoyment	Glad, elated	54
Sad	Feeling sorrow or gloom	Blue, depressed	44
Angry	Feelings from annoyance and frustration to fury	Mad, furious	44
Nervous	Experiencing fear and anxiety	Fearful, anxious	27
Relaxed	Feeling at ease and peaceful	Calm, serene	25
	Associated Emotion Responses		
Proud	Feeling of satisfaction as a result of an achievement	Accomplished, established	9
Surprised	Feeling astonishment caused by an unexpected event	Shocked, startled	6
Embarrassed	Feeling of discomfort with oneself caused by one's socially unacceptable act being witnessed by others	Humiliated, ashamed	6
Disappointed	Feeling of dissatisfaction due to failures and violated expectations	Discouraged, dissatisfied	5
Love	Feeling of deep affection and care	Cherished, cared for	4
None	Assigned if the response did not fit any of the categories, or fit into more than one	Bad, safe	913
	Step 2 Non-emotion responses (responses coded as *None*)		
Metaphors	Responses describing an emotion in metaphoric terms	Wobbly bridge, like hell	201

Social Experiences	Social or interpersonal situations and behaviors that caused or produced an emotional experience	Underappreciated, bullied	157
Other Emotion Words	Emotion words not referring to the ten primary emotion categories (coded in Step 1)	Bored, relieved	145
Personality Traits	Stable individual characteristics (as opposed to temporary emotional states)	Shy, friendly	113
Physical Reactions	Bodily sensations, behavior or physical expression of emotion	Crying, sweaty	86
Activities	Specific actions that cause or are associated with an emotion	Daydreaming, taking a nap	49
None	All other responses that did not fit above described categories	Fast, tight	63

Table 2

Gender differences in category-level emotion vocabulary

Target Emotion Category	Male n = 93	Female n = 137	*df*	*t*	Independent Samples Mann-Whitney U Test
Total responses by target categories					
Happy	6.07 (2.76)	7.54 (2.75)	197.41	**-3.99*** **	**4498 (.001)*** **
Relaxed	5.66 (2.48)	6.26 (2.41)	193.45	-1.84	5449 (.06)
Angry	6.31 (2.80)	7.24 (2.72)	193.95	**-2.50*** **	5006 (.006)*
Sad	5.63 (2.85)	7.04 (3.30)	214.96	**-3.43*** **	**4658 (.001)*** **
Nervous	5.03 (2.91)	6.22 (2.92)	198.50	**-3.01*** **	5272 (.023)*
Low arousal	5.64 (2.4)	6.65 (2.53)	204.71	**-3.05*** **	**4799.5 (.001)*** **
High arousal	5.8 (2.35)	7.00 (2.33)	196.72	**-3.78*** **	**4325.5 (.001)*** **
Target emotion responses					
Happy	3.44 (1.62)	3.96 (2.19)	228	-1.94*	5574 (.102)
Relaxed	1.81 (1.25)	2.04 (1.22)	193.56	-1.38	5714.5 (.170)
Angry	2.67 (1.32)	2.95 (1.57)	217.81	-1.47	5947.5 (.382)
Sad	1.48 (1.34)	1.90 (1.35)	198.83	-2.29*	5155.5 (.012)*
Nervous	1.82 (1.25)	2.26 (1.40)	211.85	-2.48*	5272 (.023)*
Low arousal	1.65 (.94)	1.97 (.94)	198.6	-2.55*	5149 (.012)*
High arousal	2.64 (.92)	3.05 (1.32)	228	-2.61*	5321 (.033)*
Associated emotion responses					
Happy	3.96 (1.80)	4.59 (2.20)	228	-2.31*	5237 (.02)*
Relaxed	2.70 (1.58)	3.15 (1.50)	191.14	-2.18*	5213 (.017)*
Angry	3.41 (1.56)	3.69 (1.79)	214.23	-1.28	5904.5 (.339)
Sad	2.26 (1.54)	2.91 (1.54)	197.88	-3.16*	**4822.5 (.001)*** **
Nervous	2.30 (1.69)	2.75 (1.64)	193.94	-2.01*	5257.5 (.033)*
Low arousal	2.48 (1.19)	3.03 (1.20)	198.5	**-3.45*** **	**4616 (.001)*** **
High arousal	3.22 (1.10)	3.68 (1.41)	228	-2.62*	5163 (.014)*
Non-emotion responses					
Happy	1.57 (1.93)	2.48 (2.20)	213.80	**-3.33*** **	**4633.5 (.001)*** **
Relaxed	2.41 (1.63)	2.74 (1.86)	213.61	-1.42	5897.5 (.331)
Angry	2.04 (1.88)	2.80 (2.23)	217.12	-2.79*	5067.6 (.008)*
Sad	2.27 (2.13)	3.18 (2.56)	218.42	-2.94*	4975 (.004)*
Nervous	2.07 (1.81)	2.75 (2.20)	228	-2.50*	5222.5 (.018)
Low arousal	2.34 (1.67)	2.96 (1.88)	228	-2.57*	5134.5 (.012)*
High arousal	1.89 (1.49)	2.68 (1.76)	228	**-3.56*** **	**4570.5 (.001)*** **

Note: Standard Deviations appear in parentheses after means. *U* and *p* values reported for the Independent Samples Mann-Whitney U Test. * $p < .05$; ******* $p < .003$ (adjusted alpha level for the number of comparisons using Bonferroni correction)

Table 3

Grade differences in category-level emotion vocabulary

Target Emotion Category	5&6 Graders (younger adolescents, n = 117)	7&8 Graders (older adolescents, n = 113)	*df*	*t*	Independent Samples Mann-Whitney U Test
Total responses by target categories					
Happy	7.14 (2.74)	6.74 (2.94)	225.5	1.05	6001 (.224)
Relaxed	6.35 (2.32)	5.67 (2.54)	224.49	2.11*	5469 (.022)*
Angry	6.80 (2.82)	6.93 (2.76)	227.97	-.34	6424 (.71)
Sad	6.80 (3.31)	6.13 (3.06)	227.58	1.58	5856 (.133)
Nervous	5.68 (2.27)	5.80 (3.56)	228	-.31	6062. 5 (.274)
Low arousal	6.57 (2.46)	5.90 (2.55)	226.9	2.03*	5634 (.05)*
High arousal	6.54 (2.17)	6.49 (2.64)	216.73	.15	6254.5 (.48)
Target emotion responses					
Happy	3.41 (1.63)	4.10 (2.26)	228	-2.65*	5632.5 (.049)*
Relaxed	1.98 (1.14)	1.90 (1.33)	220.09	.49	6094 (.289)
Angry	2.42 (1.29)	3.27 (1.54)	228	**-4.62*** **	**4370 (.001)*** **
Sad	1.28 (1.16)	2.19 (1.40)	217.31	**-5.38*** **	**4068 (.001)*** **
Nervous	2.03 (1.25)	2.12 (1.47)	228	-.50	6558.5 (.916)
Low arousal	1.64 (.79)	2.05 (1.06)	228	**-3.39*** **	5196 (.004)*
High arousal	2.62 (.98)	3.17 (1.33)	228	**-3.57*** **	**4959.5 (.001)*** **
Associated emotion responses					
Happy	4.15 (1.83)	4.53 (2.28)	228	-1.42	6068 (.276)
Relaxed	3.03 (1.53)	2.90 (1.58)	226.98	.64	6130.5 (.332)
Angry	3.26 (1.70)	3.91 (1.66)	227.98	**-2.96*** **	**4939 (.001)*** **
Sad	2.48 (1.53)	2.82 (1.59)	226.80	-1.67	5767.5 (.089)
Nervous	2.53 (1.50)	2.61 (1.84)	215.71	-.37	6535 (.879)
Low arousal	2.76 (1.17)	2.86 (1.29)	224.03	-.66	6404 (.68)
High arousal	3.31 (1.21)	3.68 (1.40)	220.95	-2.17*	5652 (.06)
Non-emotion responses					
Happy	2.56 (2.26)	1.66 (1.90)	228	**3.26*** **	**5085.5 (.002)*** **
Relaxed	2.89 (1.79)	2.31 (1.72)	228	2.51*	5323.5 (.009)*
Angry	2.75 (2.17)	2.23 (2.05)	227.89	1.88	5648.5 (.053)*
Sad	3.21 (2.52)	2.41 (2.28)	227.05	2.52*	5299.5 (.009)*
Nervous	2.42 (1.82)	2.53 (2.31)	228	-.41	6458.5 (.759)
Low arousal	3.05 (1.82)	2.36 (1.76)	228	2.91*	**5028 (.002)*** **
High arousal	2.58 (1.59)	2.14 (1.77)	223.4	1.98*	5310.5 (.01)*

Note: Standard Deviations appear in parentheses after means. *U* and *p* values reported for the Independent Samples Mann-Whitney U Test.
* $p < .05$; *** $p < .003$ (adjusted alpha level for the number of comparisons using Bonferroni correction)

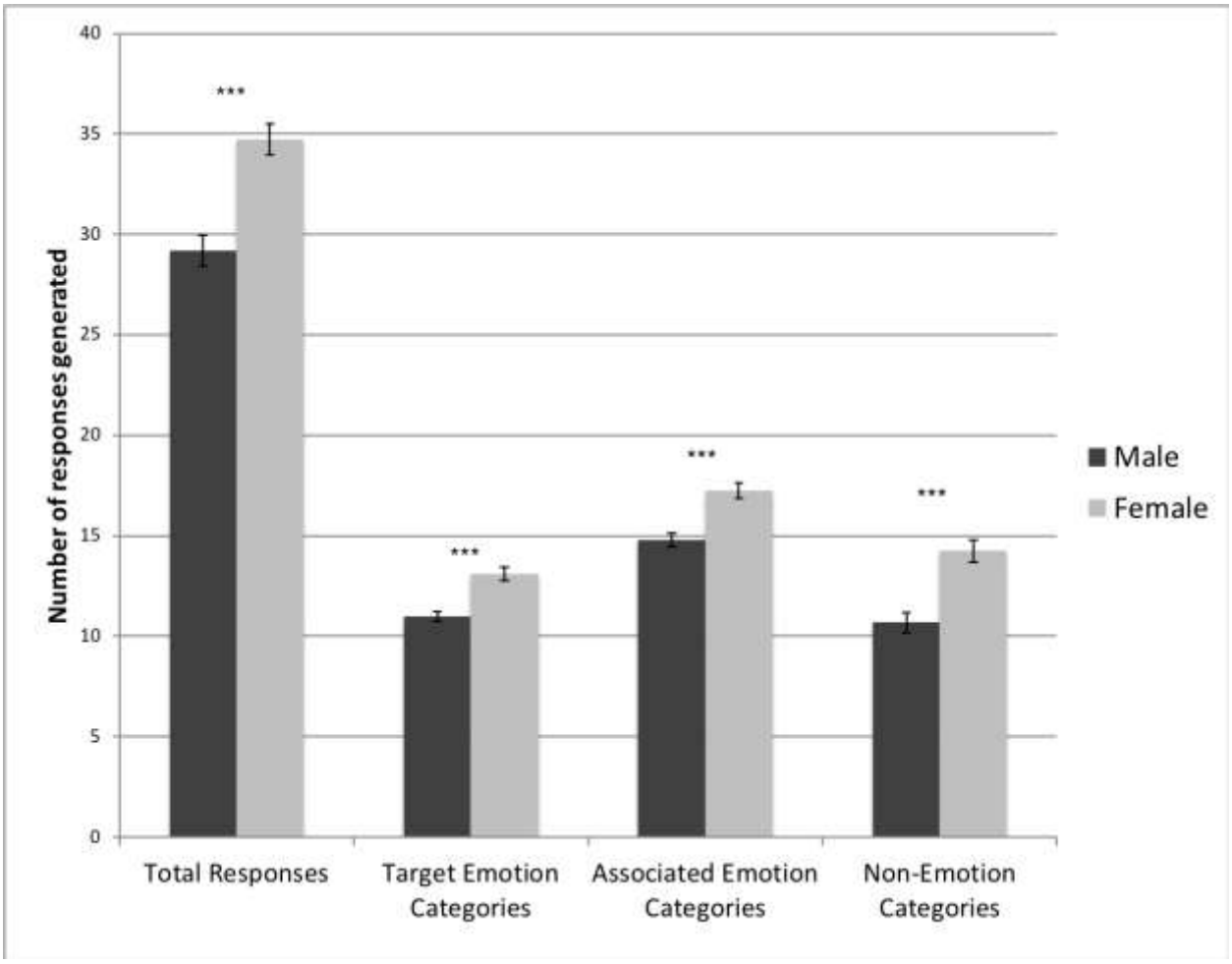
Table 4
Taxonomy of fitted models predicting generation of target emotion responses

	Model 1	Model 2	Model 3	Model 4
Gender	-1.88** [-3.106, -.654]		-.73 [.346, .44]	
Grade		1.47*** [.939, 1.994]	1.47*** [.977, 1.955]	1.48*** [.992, 1.971]
Total generated responses			.16*** [.109, .201]	.16*** [.117, .207]
Emotion understanding score on MSCEIT-YV			.08** [.022, .131]	.08** [.028, .136]
Intercept	13.095*** [12.135, 13.874]	2.746 [-.751, 6.242]	-10.639** [-17.585, -3.693]	-11.876** [-18.560, -5.192]
R^2	.18	.12	.32	.31
df_m	1	1	4	3
df_r	228	228	214	215
F	9.13	30.02	24.81	32.45

β (unstandardized coefficients) reported for each variable; 95% confidence intervals in brackets
*$p < .05$, ** $p < .01$, *** $p < .001$

Figure 1

Gender differences in generated responses

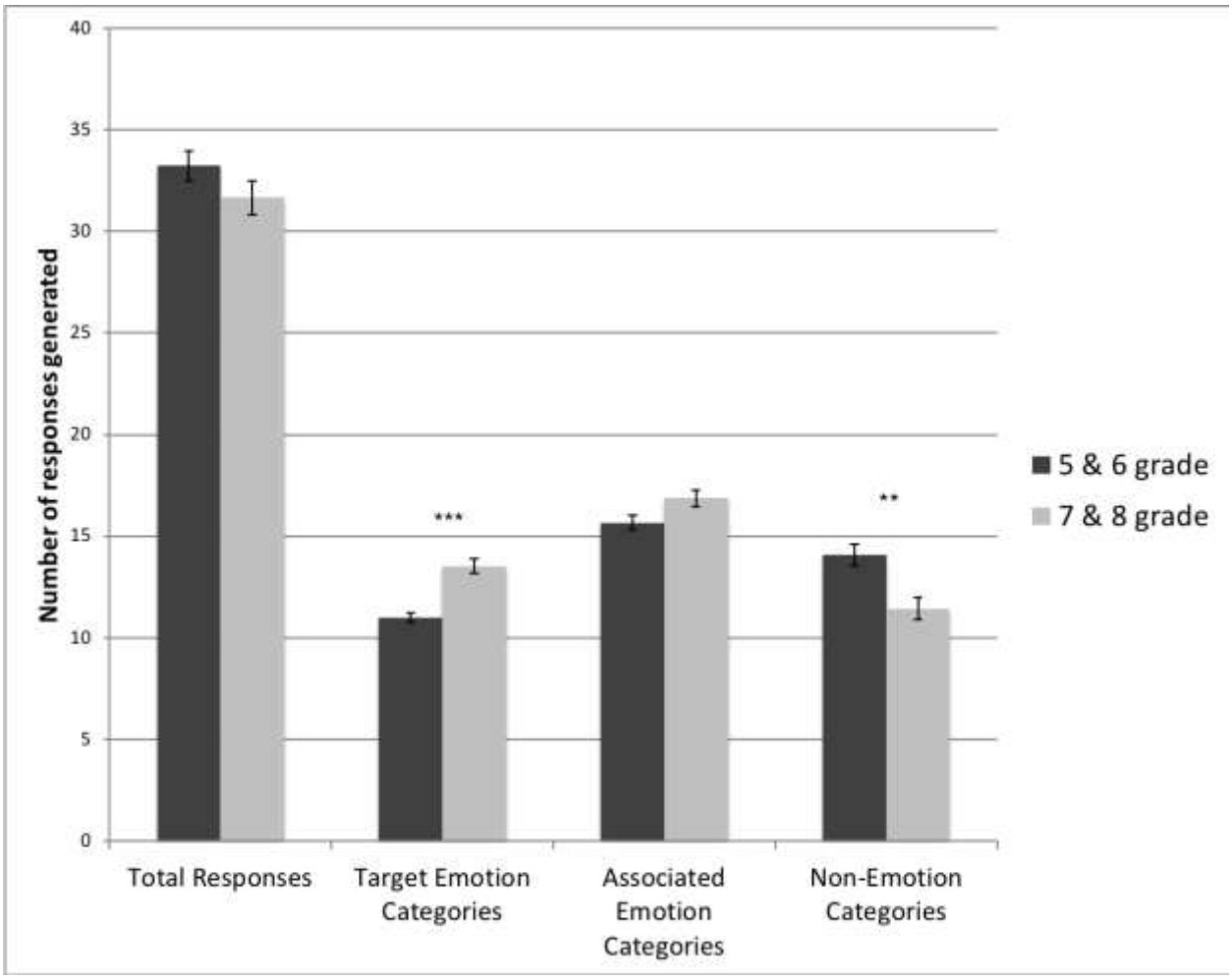


Note: Bars indicate standard errors
* $p < .05$, ** $p < .01$, *** $p < .001$.

Figure 2

Grade differences in generated responses

2a: Grade group differences in generated responses



Note: Bars indicate standard errors
* $p < .05$, ** $p < .01$, *** $p < .001$.

2b: Trajectory of grade level differences in generated responses