Emotion

Expressive Enhancement, Suppression, and Flexibility in Childhood and Adolescence: Longitudinal Links With Peer Relations

Yingqian Wang and Skyler T. Hawk

CITATION

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Yingqian Wang and Skyler T. Hawk
The Chinese University of Hong Kong

The ability to flexibly enhance or suppress emotional expressions in accordance with contextual demands is regarded as a marker of better adjustment among adults. Within a longitudinal framework, the present study explored levels of expressive flexibility in late childhood and early adolescence, as well as their potential bidirectional links with friendship quality and peer status. Participants ($N = 368$) were recruited from 2 primary schools and 2 junior high schools in China. They were tested across 2 waves with a 6-month interval. Expressive enhancement, suppression, and flexibility were measured by a laboratory task. Friendship quality and peer status were measured by self-reports and peer nomination, respectively. Results indicated that: (a) children's expressive enhancement, suppression, and flexibility significantly increased from Wave 1 to Wave 2, but there were no significant differences between primary and junior high school students; (b) females showed a trend toward higher suppression ability, compared with males, but there were no gender differences in expressive enhancement or flexibility; (c) greater friendship quality at Wave 1 predicted greater expressive enhancement, suppression, and flexibility at Wave 2, but none of these components predicted later friendship quality; (d) Wave 1 peer status positively predicted later suppression and expressive flexibility scores, while Wave 1 suppression significantly predicted higher Wave 2 peer status. The consistent associations from earlier social adjustment to later expressive flexibility components suggest that children's positive peer relations might be beneficial for their abilities to regulate emotional expressions.

Keywords: expressive flexibility, emotion regulation, friendship quality, peer status, Chinese children and adolescents

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Our outward emotional expressions often differ from our internal feelings. We might feel a need to exaggerate our excitement when receiving unwanted gifts, or avoid showing irritation toward friends. Thus, both enhancing and suppressing emotional expressions are common components in everyday social interactions. Expressive flexibility (EF), or the ability to flexibly enhance and suppress emotional expressions in line with contextual demands, is regarded as a marker of psychological well-being among adults (Bonanno, Papa, Lalande, Westphal, & Coifman, 2004). Nevertheless, there continue to exist several critical gaps in the research on EF and its components. First, little is known about the EF of younger individuals. Second, several studies have focused on links between EF abilities and intrapersonal well-being (e.g., depression, stress), but the potential connections between EF and the quality of interpersonal relationships have been largely ignored. Finally, while many studies have argued for the benefits of expressive enhancement, suppression, and flexibility for psychological adjustment, none of them have considered the extent to which earlier adjustment might predict later success in these abilities. Within a longitudinal framework, the present study aimed to explore the development of EF and its components in late childhood and adolescence, as well as their possible bidirectional links with peer relations.

Expressive Flexibility: Definition, Measurement, and Development

Conceptually, EF is a part of the broader notion of emotion regulation, reflecting the flexible modulation of external emotion expressions to align with situational demands. Most previous research has focused on the regulation of internal states, as opposed to regulation of external expressions. Moreover, existing research has tended to categorize specific regulatory strategies in terms of their "healthy and adaptive" or "unhealthy and maladaptive" consequences (see Aldao, Nolen-Hoeksema, & Schweizer, 2010 for a review). Nevertheless, the effects of any specific regulation strategy are very likely to vary across contexts and people. For example, chronic overuse of expressive suppression has been linked to a range of psychological and health costs, such as decreased subjective well-being (Gross & John, 2003) and increased blood

Yingqian Wang and Skyler T. Hawk, Department of Educational Psychology, The Chinese University of Hong Kong.

Correspondence concerning this article should be addressed to Yingqian Wang, Department of Educational Psychology, The Chinese University of Hong Kong, Room 606, Chen Kou Bun Building, Shatin, N.T., Hong Kong 999077, China. E-mail: wangyingqian@link.cuhk.edu.hk

pressure (Butler et al., 2003), but it may also help us avoid embarrassment in public situations. Similarly, although emotional expressiveness is widely acknowledged as serving important interpersonal and intrapersonal functions, such as conveying thoughts and behavioral intentions (Fischer & Manstead, 2008), expressing emotions inappropriately may also intensify distress or damage social bonds. The context-based appropriateness of particular strategies has led some to suggest that the ability to flexibly modulate emotion expressions should be a more potent indicator of adjustment than either of these skills, individually (Bonanno et al., 2004).

Bonanno et al. (2004) initially demonstrated the utility of the EF construct, using a within-subjects laboratory task that examined the ability to flexibly regulate emotional expressions both upward and downward. In this paradigm, participants view blocks of pleasant and unpleasant evocative pictures, while under the impression that another participant (who is not actually present) is observing them via a camera from another room. The "viewer's" task is ostensibly to guess the participants' emotional reactions to the pictures based on their facial expressions. Before each block, participants are instructed to either enhance expressions (to decrease the difficulty of guessing), suppress expressions (to increase the difficulty of guessing), or behave "normally" (participants are told that the camera is switched off). Therefore, the "normal" viewing condition serves as a baseline measure of expressiveness, allowing for within-subjects comparisons between conditions. Specifically, expressive enhancement is indexed by the discrepancy between enhancement and normal conditions, while suppression indexed by the discrepancy between suppression and normal conditions. EF is then composited from these two scores. Generally, this paradigm provides an objective and rigorous measurement of EF, which has been adopted in several previous studies to explore its links with psychological well-being.

Nevertheless, to our knowledge, this laboratory paradigm has not yet been used to examine expressive enhancement, suppression, and overall flexibility among children and adolescents. Therefore, the basic characteristics of EF at this stage, such as age and gender differences, are still unclear. Westphal, Seivert, and Bonanno (2010) noted that EF is fairly stable among undergraduates, with all components (enhancement score, suppression score, and overall EF) being moderately to highly correlated across a 3-year period. However, because EF is defined as an aspect of regulatory ability, it stands to reason that children and adolescents are still working to grasp this skill by continually accumulating related experience in social interactions. Several review articles have suggested that individuals learn to regulate their emotions in a gradual and continuous manner, from almost total dependence on caregivers at birth to independently managing their own emotions in adulthood (Cole, Martin, & Dennis, 2004; Sabatier, Restrepo Cervantes, Moreno Torres, Hoyos De los Rios, & Palacio Sañudo, 2017; Zeman, Cassano, Perry-Parrish, & Stegall, 2006). Additionally, empirical research has revealed age-related increases in general self-regulation (Raffaelli, Crockett, & Shen, 2005) and knowledge of emotion display rules (Jones, Abbey, & Cumberland, 1998). The use of adaptive internal emotion regulation strategies, such as cognitive reappraisal, also showed an upward trend from childhood to early adulthood (Gullone, Hughes, King, & Tonge, 2010; McRae et al., 2012). Specific to external, expressive regulation, however, more empirical research is needed to show its

developmental course. In addition, girls are usually considered to develop faster and earlier than boys on various affective abilities, such as emotion recognition (see McClure, 2000 for a review) and internal emotion regulation (e.g., Nolen-Hoeksema & Aldao, 2011). It remains to be tested whether such gender difference also applies to EF abilities.

The Adaptiveness of EF Abilities for Psychological Well-Being

The adaptiveness of EF for adults has been demonstrated in a series of studies, by showing its positive links with psychological adjustment. Using the laboratory paradigm, Bonanno et al. (2004) first showed that EF buffered against distress among New York City undergraduates who had recently experienced the 9/11 terrorist attack. Those with higher EF were less distressed 1 and a half years later, after controlling for the initial distress measured in the immediate aftermath of 9/11. The positive association between EF and psychological well-being was then replicated in a follow-up study (Westphal et al., 2010), in which participants scoring higher in EF were rated by friends as having better adjustment (e.g., mental health and well-being, physical health, coping ability), especially if participants were experiencing high life stress. Moreover, two studies targeting special populations respectively showed that high EF acted as a buffer against complicated grief among bereaved adults (Gupta & Bonanno, 2011), and against posttraumatic stress disorder and depression among combat veterans (Rodin et al., 2017).

In addition to exploring the overall EF construct, previous studies have examined the unique effects of expressive enhancement and suppression, respectively. While some research suggested the equal importance of these two abilities (Bonanno et al., 2004; Gupta & Bonanno, 2011), others found a stronger predictive effect of enhancement (Rodin et al., 2017) or suppression (Westphal et al., 2010) for certain aspects of well-being. Most recently, Chen, Chen, and Bonanno (2018) directly compared the predictive effects of expressive enhancement and suppression for well-being and mental health among Chinese college students, using a validated EF self-report scale (Burton & Bonanno, 2016). Results indicated that suppression ability uniquely predicted lower depression and anxiety, while enhancement ability held a significant direct link with higher life satisfaction. This suggests that these two components of EF are separate but related constructs, with their functions reflected in different aspects of individual adjustment. However, life satisfaction was additionally predicted by an interaction between EF components, such that scores on this outcome were higher when both enhancement and suppression scores were high. Overall, these findings supported the notion that a combination of enhancement and suppression skills are valuable for well-being, while emphasizing that any investigation of the EF construct also necessitates examination of the potential unique effects of its two foundational components.

Links Between EF Abilities and Peer Relations

Taken together, most previous EF research has focused on its links with indices of psychological well-being, such as depression, stress, and life satisfaction. In contrast, potential connections between EF abilities and social adjustment have been largely ig-

nored. Given the myriad novel social and emotional situations encountered in late childhood and adolescence, EF abilities might be helpful for forming good interpersonal relationships at this stage. Emotion expressions serve vital functions in social relationships, by conveying information and intentions, evoking reciprocal interactions, and inciting or deterring others' behaviors (Keltner & Haidt, 1999). Several theoretical accounts have emphasized the social functions of emotion expression. For example, emotion expression is a fundamental component of emotional intelligence (Mayer & Salovey, 1997) and affective social competence (Halberstadt, Denham, & Dunsmore, 2001). The expanded social information processing model (Lemerise & Arsenio, 2000) integrates emotional elements into the original cognitive model and highlights the importance of both external and internal emotion regulation. More recently, the emotion as social information model (van Kleef, 2009) has specified how emotion expressions might affect others' behaviors through inferential and affective processes. Thus, theoretically, the contributions of expressive behaviors to social interactions have been widely acknowledged.

Empirical research has also suggested that emotion expression processes might impact children's interactions with peers. As early as the preschool stage, children's sociometric preference scores can be positively predicted by spontaneous expressivity, as rated by teachers (Walden & Field, 1990). Regarding older children, Hubbard (2001) observationally coded the emotion expressions of second-grade African American students playing two competitive games. Children who had received low-status social preference scores from their peers expressed more facial and verbal anger than other children; they also exhibited more nonverbal happiness in favorable turns of the game. Additionally, Perry-Parrish and Zeman (2011) showed that adolescent boys who reported being good at minimizing sadness displays had higher peer acceptance and lower parent-rated social problems. In another study (Perry-Parrish et al., 2017), early adolescents' anger inhibition, as rated by themselves and by peers, was positively related with social acceptance. Generally, these studies provided ample support for a connection between emotional expressions and social functioning, especially regarding the potential benefits of expressive suppression. However, all aforementioned studies concentrated solely on the expression or inhibition of certain emotions, without considering both processes or children's flexibility in alternating between the two. To our knowledge, the present study is the first to consider potential links between youth's peer relationships, on the one hand, and expressive enhancement and suppression, on the other hand, within a single model. Furthermore, this research extends prior studies on the benefits of EF abilities for individual well-being, by examining whether these skills might also predict success in social relationships.

Although most prior cross-sectional research has interpreted findings in terms of how children's expressive regulation might impact their peer relationships, it is also possible that peer relationships have effects upon children's expressive regulation. Importantly, prior studies examining links between children's expressive regulation and peer relations have been limited by cross-sectional designs, which cannot specify developmental order. Additionally, while several studies have shown that EF abilities predict psychological well-being over time, none have utilized analytical approaches (i.e., hierarchical regression) that allowed for an examination of the reverse associations. Thus, the question of whether peer relationships might contribute to children's abilities to regulate emotional expressions has not yet been addressed. Managing emotional displays is assumed to be costly to cognitive functioning, and taxes self-regulatory abilities (Bonanno et al., 2004; Muraven, Tice, & Baumeister, 1998). Previous experimental research has demonstrated that social exclusion or ostracism impairs self-control (Baumeister, DeWall, Ciarocco, & Twenge, 2005; Guyer, Caouette, Lee, & Ruiz, 2014), which may further lead to greater difficulties in expressive regulation. Moreover, long-term social exclusion or suboptimal peer relationships could trigger a series of mental problems, such as social anxiety, loneliness, depression, and low self-esteem (Leary, 1990). This could decrease children's confidence in interpersonal interactions, and lead them to give up on attempts to make a good impression by managing their own emotional behaviors. Finally, according to the framework of interpersonal emotion regulation (IER; Zaki & Williams, 2013), people often pursue emotional goals through social processes. For example, many people seek out the company and suggestions of others in times of distress as a way of regulating their negative affect. Therefore, supportive peers might help children to manage their emotions. In contrast, lack of good peer relations may deprive children of opportunities to gain experience, training, and social feedback in regulating external expressions, leading to lower EF abilities. Taken together, poor social adjustment might act as a disruptive force upon youth's regulation of emotional expressions, and impede the development of EF and its individual components.

In sum, we predicted that children's expressive enhancement, suppression, and overall flexibility may show reciprocal associations with the quality of their peer relationships. In testing this hypothesis, we tested both levels of peer relations (Gifford-Smith & Brownell, 2003): friendship and peer status. Friendship emphasizes mutual, voluntary, and lasting intimacy among peers, while peer status reflects the degree to which a child is unilaterally liked or disliked by peers. Higher peer status is usually considered as the foundation of better friendship quality, but the two are still conceptually different and reflect two aspects of peer relations (Gifford-Smith & Brownell, 2003). To measure children's social adjustment more comprehensively, it is necessary to include both constructs.

In addition, until now, most investigations of EF abilities have utilized Western samples. Although the research by Chen et al. (2018) evidenced the positive associations between EF components and psychological adjustment in a Chinese sample, its cross-sectional design and exclusive use of self-reported measurements may restrict the generalization of results. This prior study also did not consider the social aspects of adjustment, which might be influenced by culture to a larger extent. Indeed, collectivistic cultures tend to hold distinct display rules that favor emotional suppression over emotional expression (Matsumoto, Yoo, & Nakagawa, 2008). In this case, it is possible that the overall construct of EF and the specific skill of expressive enhancement might be less important to social relationships than strong suppression skills, again emphasizing the need to examine these individual regulatory abilities in addition to the overall EF construct. Summarily, investigating the links that social relationships hold with EF abilities among Chinese children would enrich the cultural diversity of the literature and thus contribute to a more complete and objective understanding of these skills.

The Present Study

The present research employed a longitudinal framework to explore the basic characteristics of youth's EF abilities, as well as its potential bidirectional links with social adjustment, in late childhood and early adolescence. The laboratory task developed by Bonanno et al. (2004) was adopted to measure children's expressive enhancement, suppression, and overall EF. We examined models that tested the unique associations between children's peer relations and their enhancement and suppression abilities, respectively (see, e.g., Chen et al. 2018), as well as models that considered EF as an overall construct. Two levels of peer relations were included as indices of social adjustment: Peer status was measured by sociometric nominations and friendship quality measured by youth's self-reports. Thus, this is a mixed-measurement and multiinformant study. A sample of Chinese children and adolescents were tested at two time points, with a 6-month interval. We hypothesized that youth's EF scores would increase with age, with older children scoring higher than younger children and scores at Wave 2 significantly higher than Wave 1. Girls were hypothesized to score higher than boys on both EF and the two component abilities. Additionally, we expected significant reciprocal links between EF abilities (enhancement, suppression, and overall EF) and both kinds of peer relations. Since previous research has indicated that peer conflict increases with age (Noakes & Rinaldi, 2006), and that girls report greater intimacy in their relationships than boys (see Rose & Rudolph, 2006 for a review), participant gender and age were examined as control variables in all models. Moreover, existing Chinese research about child emotion regulation has typically utilized samples exclusively from large cities (e.g., Deng, Sang, & Luan, 2013; Zhao & Zhao, 2015), despite the fact that there can exist substantial differences between urban and rural areas of China (Knight & Song, 1999). In particular, the latter might ascribe more strongly to traditional display rules about emotional behavior. To increase the sample diversity, we recruited participants from both urban and rural schools, and controlled for school region in the models with no *priori* hypotheses.

Method

Participants

Participants were primary and junior high school students recruited for the Facing Rejection Project, a broader longitudinal study on Chinese children's emotions and interpersonal relationships. They were from two primary schools and two junior high schools (one rural and one urban school for each school level) of Shandong Province in eastern China. The final sample size resulted from our efforts to recruit roughly equivalent numbers of primary and junior high school students across different grades, as well as from the need to sample entire classes of children for the purposes of our peer nomination measure. At the first measurement (Wave 1), 378 participants (47.4% female) completed both the EF task and the surveys. They aged between 9 and 15, with the mean age at 12.21 years ($SD = 1.58$). The second measurement (Wave 2) was conducted 6 months later. At Wave 1, students were respectively from Grade 4 ($N = 81$; $M_{age} = 10.12$ years, $SD = 0.36$) and Grade 5 ($N = 95$; $M_{age} = 11.13$ years, $SD = 0.46$) of primary school, and Grade 7 ($N = 95$; $M_{age} = 12.99$ years, $SD =$

0.32) and Grade 8 ($N = 107$; $M_{age} = 14.06$ years, $SD = 0.36$) of junior high school. Students in Grade 6 were not included, because they would move from primary school to junior high school between the two measurements, making it difficult to follow them. Five participants (two girls and three boys) were lost due to students changing school or quitting participation. In addition, data of five participants (two girls and three boys) were excluded because of obvious distraction during the EF task, failure to follow task requirements, or corrupted EF video clips.[1] Therefore, there remained 368 valid participants.

Stimuli

In the EF task, described below, participants viewed a series of emotion-inducing (positive and negative) images. To avoid participants' habituation to the pictures, we used two different sets of images in each wave. Before each measurement, we respectively selected an initial set of 80 affective pictures (160 pictures in total; half positive and half negative) that were deemed suitable for Chinese children from the International Affective Picture System (IAPS; Lang, Bradley, & Cuthbert, 2005), the Chinese Affective Picture System (CAPS; Bai, Ma, Huang, & Luo, 2005), and the Taiwan Affective Picture System (TAPS; Yen, Liao, Yang, Huang, & Tsai, 2013). We further supplemented these sets through online image searches. Positive pictures included images such as beautiful scenery, amusing animals, and champion Chinese athletes in the Olympics, while negative pictures included images such as crying children, insects crawling on food, and snakes. For ethical reasons, we also consulted a subset of children's teachers and replaced pictures that they deemed too upsetting.

To ensure that the pictures used in the task could evoke children's strong emotions, we carried out a pilot study for picture selection before each measurement. Participants of both pilot studies were students in Grade 7 (Wave 1: $N = 94$, $M_{age} = 12.25$ years, $SD = 0.53$; Wave 2: $N = 91$, $M_{age} = 13.25$ years, $SD = 0.50$). They were asked to report their feelings when viewing each picture on a 7-point scale (1 = *very unpleasant*, 4 = *neutral*, 7 = *very pleasant*). For each wave, we selected 15 positive pictures with the highest average scores and 15 negative pictures with the lowest average scores. The remaining 30 pictures were distributed into three positive and three negative blocks, with balanced average valance scores to ensure the stimuli were equally positive or equally negative across the respective picture blocks. These six picture groupings were held constant for all participants. An additional five positive and five negative pictures that fell just short of the selection cutoff were used in practice blocks. As in Bonanno et al.'s (2004) original procedure and subsequent research, a range of positive (e.g., amusement, pride, excitement) and negative (e.g., sadness, disgust, fear) emotions were considered, but the blocks did not distinguish separate emotion categories. All stimulus materials are available from the authors upon request.

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[1] Two of these five participants were excluded due to obvious distraction during the EF task either on Wave 1 or Wave 2. Two participants were excluded because they were unable or unwilling to follow the task requirements. The remaining one participant completed the EF task on both waves, but the digital video file of Wave 2 was corrupted. The main results remained nearly identical whether or not the five participants were excluded.

Procedure

Research design and procedures were approved by the Research Ethics Board of the project PI's institution ahead of data collection. In the recruitment phase, the investigators visited the target schools, explained the research aim to principals, and received school approval. Letters describing the purpose and content of the study were distributed in advance to participants' parents. All children's participation in the study was voluntary, and parents had the right to cease their children's participation at any time. Participants were surveyed at two time points: March and September of two consecutive school years. Students stayed with the same classmates across this period. At each measurement, the same batch of questionnaires was administered in classrooms under the supervision of research personnel. The EF task was then administered to children individually on computer.

The EF task established by Bonanno et al. (2004) was adopted for this study. In this task, participants sat in front a computer and were individually filmed with a camera placed above their line of vision, while viewing emotion-inducing (positive and negative) pictures that were presented via E-Prime 2.0. Before starting, a research assistant first explained the task in detail. Participants were told that: *You will complete a task about emotions with another child in the next room. You will be shown a series of pictures in blocks. The other child cannot see these pictures, but he or she would sometimes view you on a video monitor and guess your emotions when viewing these pictures*. The "observer" was not actually present, and the deception was only to stimulate participants' motivation to alter their expressions. The instructors further explained that there were three different tasks, asking participants to: (a) sometimes enhance their emotional expressions, to facilitate the observer's guess of their feelings; (b) sometimes suppress their expressions, so the observer could not easily guess their feelings; (c) sometimes behave "normally" (i.e., react naturally without any exaggeration or hiding of their feelings), because the camera was off and the observer would not see them. Participants were told that one of three instructions would be presented before each block to tell them the required action, and that to better complete the "game" with peers, they must try their best to follow the instructions. After each block, participants were asked to rate their true feelings on a 9-point scale (-4 = *extremely negative*, 0 = *neutral*, 4 = *extremely positive*).[2]

The task was adapted for use with younger participants, which entailed several minor changes to make it more suitable. To make sure that children could fully understand the task, we gave them detailed oral explanations of enhancement and suppression, and added two practice trials (one trial for enhancement condition and one for suppression condition), which were not present in Bonanno et al.'s (2004) original procedure. The formal task started after the practice. There were six task blocks (two enhancement, two suppression, two "normal"), with each block containing five pictures. In keeping with the original procedure, half of the blocks contained positive images, and the other half contained negative images. The six blocks were presented in a completely random order. The matches between three instructions and different picture blocks, as well as the sequence of pictures within each block, were also random. Each picture stimulus was presented for 7 s, with 2 s between stimuli.

Measures

Expressive flexibility. At each wave, three trained coders with a bachelor or master's degree in psychology rated participants' emotional expressions across each stimulus block. One of the three Wave 1 coders was replaced in Wave 2, while the other two coded both waves of videos. Coders had never seen the emotional stimuli, and had no knowledge of the participants' instructions. As in the original paradigm, coders were asked to rate the intensity of participants' positive emotion from 1 = *no positive emotion* to 7 = *extreme positive emotion*, and then the intensity of their negative emotion from 1 = *no negative emotion* to 7 = *extreme negative emotion* for each block, but only the matching valence ratings were used for further analyses (e.g., negative ratings for negative picture blocks). However, considering potential individual differences in expressive responding to the same picture (e.g., a generally unpleasant picture may elicit amused responses from certain children), as well as to account for expressions with ambiguous valence (e.g., surprise), we additionally asked coders to rate children's overall emotional expressivity, regardless of positivity or negativity, from 1 = *none* to 7 = *extreme* (see Vohs, Baumeister, & Ciarocco, 2005, Study 3, for a similar approach). Agreements on three coding items were all adequate, with intraclass correlation coefficients (Wave 1/Wave 2) = .94/.94 for positivity, .91/.92 for negativity, and .89/.91 for expressivity.

Calculation of participants' EF scores followed the formula of Westphal et al. (2010), which was an extension of the formula originally used by Bonanno et al. (2004). Expressive enhancement ability was obtained by subtracting the mean valence-matched positivity or negativity score in the normal condition from the mean score in the enhancement condition (Enhancement − Normal). Expressive suppression ability was calculated by subtracting the mean positivity/negativity score in the suppression condition from the mean score in the normal condition (Normal − Suppression). Finally, the overall EF score was calculated according to Westphal et al.'s (2010, p. 94) "balanced expressive flexibility" formula, in which the absolute value of the difference between the enhancement and suppression scores is subtracted from their sum; that is EF = (Enhancement + Suppression) − |Enhancement − Suppression|. This formula provides a better index of EF than a sum score, because it protects against a high EF score being the result of strong abilities in one task but not the other. The same method was used to calculate another set of enhancement, suppression, and EF scores from the general expressivity ratings. Scores from these two types of ratings showed strong correlations, with rs (Wave 1/Wave 2) = .78/.84 for enhancement, .91/.94 for suppression, and .79/.83 for EF. To stay consistent with previous literatures, we treat scores derived from the positivity/negativity ratings as our primary analyses. Results from expressivity ratings are included in the online supplementary material.

Friendship quality. Parker and Asher's (1993) Friendship Quality Questionnaire (FQQ) was used. Items ask children to indicate how true a particular statement is regarding their relation-

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[2] In the original paradigm, participants were asked to respectively rate the intensity of their positive and negative feelings on two scales, which we found in pilot tests might be too complicated for some younger children. Thus, we instead used a unidimensional scale.

ships with their best friend on a 5-point Likert scale (1 = *not at all true* to 5 = *really true*). The Chinese version adapted by Zou (1998) includes 25 items and five dimensions: *trust and support* (e.g., he or she cares about my feelings), *companionship and recreation* (e.g., we always play together at recess), *validation* (e.g., he or she tells me I am pretty smart), *intimate exchange* (e.g., we always tell each other our problems), *conflict and betrayal* (e.g., we argue a lot). A latent friendship quality variable was constructed by the average score of each dimension. The internal consistencies of each dimension and the total scale across two waves were α = .72/.77 (trust and support), .72/.76 (companionship and recreation), .77/.77 (validation), .75/.75 (intimate exchange), .57/.60 (conflict and betrayal), and .91/.92 (total scale).

Nominated peer status. In addition to participants' self-reported friendship quality, we also measured their objective peer status with peer nomination techniques. By the first measurement, participants had been in their current classes for at least 6 months and thus were familiar with their classmates. They were asked to choose three classmates they liked most on a class list, as well as three whom they liked least. The numbers of nominations that children received on the two items, defined as peer acceptance and peer rejection, respectively, were first standardized within class to $M = 0$ and $SD = 1$. Peer status was then computed by subtracting the peer rejection score from the peer acceptance score for each child (Cillessen & Bukowski, 2000).

Data Analyses

First, basic characteristics of children's EF abilities were explored with SPSS 20.0, including gender and age group (primary school vs. junior high school) differences. Next, correlations among the study variables were computed. Finally, the overtime associations between EF components and peer relations were examined with the autoregressive cross-lagged model approach. This model allows for synchronous examination of longitudinal

effects of one construct upon another, and vice versa, while controlling for concurrent associations between constructs and the stability of each construct over time. In all models, we controlled for the effects of child gender, age, and school region; gender was dummy-coded as 0 for girl and 1 for boy; region was also dummy coded as 0 for urban and 1 for rural. Analyses were conducted with Mplus 7.0. The model fit was considered acceptable when the Comparative Fit Index (CFI) and Tucker Lewis Index (TLI) values were at or above .90, while Root Mean Square Error of Approximation (RMSEA) and Standardized Root Mean Square Residual (SRMR) values were at or below .08 (Kline, 2011).

Results

Manipulation Check of the EF Task

Some foundational analyses were first conducted to show the validity of the within-subject manipulation. Ideally, in line with Bonanno et al.'s (2004) initial research, we would expect that the different tasks would significantly influence the rating scores from coders but have little influence on participants' subjective ratings. Because participants and coders used different rating scales in the present study, these reports were analyzed separately but were collapsed across valence (Westphal et al., 2010). Results are shown in Figure 1. First, for coder ratings, we respectively ran a repeated-measures ANOVA between three tasks (enhancement, suppression, normal) for Wave 1 and Wave 2, separately. Results indicated that the main effect of task was significant at both waves, Wave 1: $F(2, 734) = 337.83$, $p < .001$; Wave 2: $F(2, 734) = 632.94$, $p < .001$. Further, pairwise comparisons revealed that, for Wave 1, the mean rating score in the enhancement condition ($M = 3.91$, $SD = 1.15$) was significantly higher than that in normal condition ($M = 3.60$, $SD = 1.09$), which in turn was significantly higher than suppression condition ($M = 2.34$, $SD = 1.17$), $ps <$
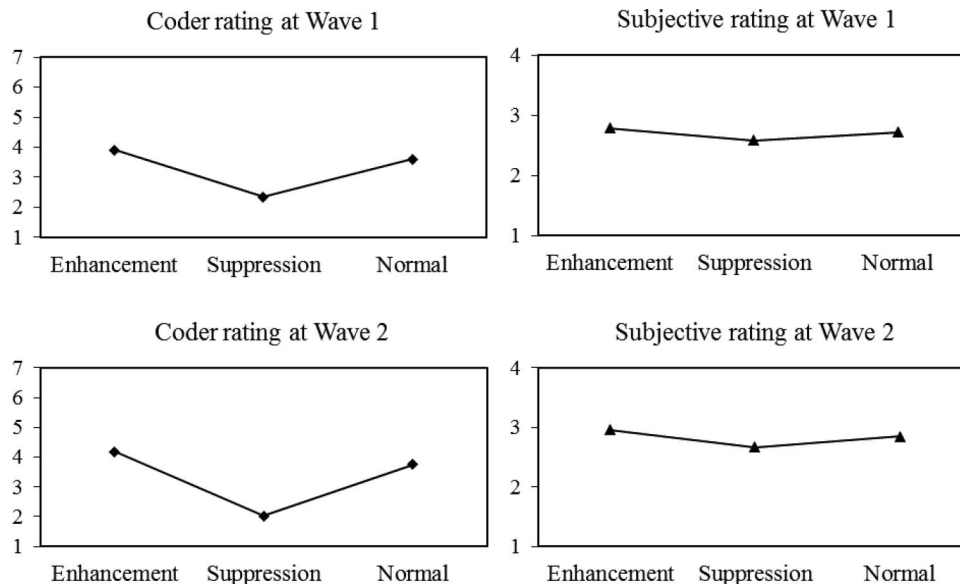

Figure 1. Coders' ratings of external emotion expressions and participants' subjective ratings of internal feelings across three tasks. Higher ratings represent stronger emotion.

.001, $d = 0.28$ and 1.11. Similarly, for Wave 2, the mean scores of enhancement ($M = 4.18$, $SD = 1.10$), normal ($M = 3.75$, $SD = 1.07$), and suppression ($M = 2.02$, $SD = 1.08$) conditions also significantly differed from each other (all $ps < .001$, $d = 0.40$ to 1.98). These results for coder scores were consistent with those reported in prior research (e.g., Bonanno et al., 2004).

Subjective ratings were first transformed intro absolute values before conducting the repeated-measures ANOVA. Contrary with our expectation, there were significant differences between tasks at Wave 1: $F(2, 734) = 9.37$, $p < .001$; and Wave 2: $F(2, 700) = 20.88$, $p < .001$.[3] For Wave 1, participants' mean rating scores in the enhancement condition ($M = 2.79$, $SD = 0.95$) and normal condition ($M = 2.72$, $SD = 0.92$) were significantly higher than that in the suppression condition ($M = 2.59$, $SD = 1.07$), $p < .001$, $d = 0.20$ and $p = .005$, $d = 0.13$, respectively; but there was no significant difference between enhancement and normal conditions, $p = .116$, $d = 0.07$. For Wave 2, the mean ratings of three conditions (enhancement: $M = 2.96$, $SD = 0.96$; suppression: $M = 2.67$, $SD = 1.10$; normal: $M = 2.85$, $SD = 0.99$) all significantly differed from each other, $ps < .01$, $d = 0.11$ to 0.28. Summarily, participants' subjective feelings changed in accordance with the task requirements, which was not as expected but also reasonable because a wealth of prior research has shown that enhancing and suppressing external expressions is capable of exerting effects upon subjective feelings (Adelmann & Zajonc, 1989; Hawk, Fischer, & van Kleef, 2012; Larsen, Kasimatis, & Frey, 1992). Because the mean valences of stimulus blocks were balanced in the pilot study, and we randomly matched the blocks with the three tasks, it is unlikely that any set of stimuli would elicit obviously stronger or weaker feelings. Moreover, compared with coder ratings, the extent that subjective ratings changed across three tasks were obviously smaller (based on the means and effect sizes). Therefore, we assumed that the manipulation was still effective.

Age and Gender Differences in EF Abilities

A $2 \times 2 \times 2$ mixed ANOVA was used, with time point (Wave 1, Wave 2) as within-subjects factor, and age group (primary students vs. junior high students) and gender (female vs. male) as between-subjects factors. Analyses were conducted separately for enhancement, suppression, and EF. The mean scores and standard deviations of different groups at both time points are presented in Table 1. Results indicated that children's enhancement ability, $F(1, 364) = 4.17$, $p = .042$, $d = 0.14$; suppression ability, $F(1, 364) = 49.64$, $p < .001$, $d = 0.37$; and EF, $F(1, 364) = 18.08$, $p < .001$, $d = 0.27$ all increased significantly from Wave 1 to Wave 2. However, there were no significant differences between primary and junior high school students on either enhancement and suppression abilities, nor for overall EF (all $ps \geq .137$). In terms of gender differences, girls showed a trend toward significantly higher suppression ability than boys, $F(1, 364) = 3.84$, $p = .051$, $d = 0.14$. No gender differences were observed for enhancement ability ($p = .210$) or overall EF ($p = .952$). There were no significant two-way or three-way interactions for enhancement, suppression, or EF scores (all $ps \geq .143$).

Correlations Between Main Variables

The zero-order correlations between study variables at both waves are presented in Table 2. Scores of the same variable at two waves were all significantly correlated (rs ranged from .19 to .81). Enhancement and suppression scores were negatively correlated with each other at Wave 1 and Wave 2 ($r = -.11$ and $-.12$, respectively), which was consistent with previous research (Bonanno et al., 2004; Westphal et al., 2010). Friendship quality was positively correlated with enhancement, suppression, and EF scores, within both Wave 1 and Wave 2 (rs ranged from .13 to .20). Peer status was positively correlated with suppression and showed a trend ($p = .085$ and .057) toward positive correlation with EF at both waves (rs ranged from .09 to .20). In addition, both Wave 1 friendship quality and Wave 1 peer status were significantly correlated or showed a trend toward positive correlation ($p = .074$) with Wave 2 enhancement, suppression, and EF scores (rs ranged from .09 to .21). Wave 2 friendship quality and Wave 2 peer status were significantly correlated with suppression and EF scores at Wave 1 (rs ranged from .13 to .16), but not significantly correlated with Wave 1 enhancement score.

Cross-Lagged Analyses: EF Abilities and Friendship Quality

The measurement model of friendship quality was first examined through confirmatory factor analysis (CFA). Results indicated that the standardized factor loadings of five dimensions were respectively (Wave 1/Wave 2) .87/.90, .85/.83, .84/.88, .80/.79, and $-.35/-.42$. The loadings on the last dimension (conflict and betrayal) were much lower than other dimensions, and below the conventional threshold of .40 at Wave 1. This finding, when combined with its low reliabilities at both waves ($\alpha = 56/.60$), led us to exclude this dimension from further analyses.[4] The measurement equivalence of friendship quality across two waves was then tested with a χ^2 difference test. There was no significant change in model fit, $\Delta\chi^2(3) = 4.53$, $p = .209$, between the unconstrained measurement model (where loadings of four factors were freely estimated) and the constrained measurement model (where factor loadings were constrained across two waves). Therefore, corresponding factor loadings of friendship quality across waves were constrained to be equal.

A first cross-lagged model examined overtime links between latent friendship quality and the separate abilities of expressive enhancement and suppression, at two time points. The effects of participant gender, age, and region were also controlled. The model fit the data well: $\chi^2(66) = 189.77$, $p < .001$, CFI = .95, TLI = .92, RMSEA = .07, 90% CI [.06, .08], SRMR = .04. Specific path coefficients are depicted in Figure 2a. Results showed significant gender differences in friendship quality at Wave 1 ($\beta = -.20$, 95% CI [$-.31$, $-.10$], $SE = .05$, $p < .001$) and Wave 2 ($\beta = -.12$, 95% CI [$-.21$, $-.04$], $SE = .04$, $p = .004$), with girls scoring higher than boys, as well as a significant age effect at Wave 2 ($\beta = -.10$, 95% CI [$-.19$, $-.02$], $SE = .04$, $p = .014$). There were no significant age or gender differences in enhancement and suppression abilities at either wave ($ps \geq .070$). Compared with urban children, rural children scored lower in enhancement at both waves (Wave 1: $\beta = -.19$, 95% CI

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[3] The subjective ratings of 16 participants were not recorded at Wave 2 due to program error, resulting in a lower *df*.

[4] Including this dimension in the following cross-lagged models did not change the pattern of results, but led to poorer model fits.

Table 1

Means and Standard Deviations of EF Components by Age Group and Gender

Measures	Primary	Junior high	Girls	Boys	Total	F value (age group)	F value (time point)	F value (gender)
N	172	196	175	193	368			
Enhancement						.45	4.17*	1.58
Wave 1	.57 (1.65)	.66 (1.51)	.58 (1.52)	.66 (1.62)	.62 (1.58)			
Wave 2	.81 (1.76)	.89 (1.64)	.71 (1.65)	.97 (1.74)	.85 (1.70)			
Suppression						.87	49.64***	3.84+
Wave 1	2.28 (2.78)	2.71 (2.51)	2.66 (2.53)	2.38 (2.74)	2.51 (2.64)			
Wave 2	3.46 (2.58)	3.49 (2.64)	3.82 (2.72)	3.16 (2.47)	3.47 (2.61)			
EF						2.23	18.08***	.00
Wave 1	−.14 (3.01)	.42 (2.70)	.26 (2.77)	.06 (2.94)	.16 (2.86)			
Wave 2	.88 (2.96)	1.01 (2.92)	.85 (3.01)	1.04 (2.87)	.95 (2.94)			

+ $p < .06$.   * $p < .05$.   *** $p < .001$.

[−.29, −.09], $SE = .05$, $p < .001$; Wave 2: β = −.17, 95% CI [−.27, −.07], $SE = .05$, $p = .001$), as well as lower in suppression at Wave 1 (β = −.17, 95% CI [−.27, −.07], $SE = .05$, $p = .001$). Both enhancement and suppression scores at Wave 1 significantly predicted their corresponding scores at Wave 2 (β = .17, 95% CI [.08, .27], $SE = .05$, $p < .001$ and β = .46, 95% CI [.38, .54], $SE = .04$, $p < .001$). Friendship quality at Wave 1 also significantly predicted friendship quality at Wave 2 (β = .67, 95% CI [.60, .74], $SE = .04$, $p < .001$). Contrary to our expectation, neither of the two expressive abilities at Wave 1 predicted friendship quality at Wave 2 (*p*s = .632 and .736, respectively). Importantly, however, friendship quality at Wave 1 significantly predicted enhancement and suppression abilities at Wave 2 (β = .14, 95% CI [.04, .25], $SE = .05$, $p = .007$ and β = .11, 95% CI [.02, .21], $SE = .05$, $p = .022$, respectively).

A similar model was constructed to examine longitudinal associations between friendship quality and overall EF. The model had a good fit: $\chi^2(52) = 164.43$, $p < .001$, CFI = .95, TLI = .93, RMSEA = .08, 90% CI [.06, .09], SRMR = .04. Urban children showed higher EF scores than rural children at both waves (Wave 1: β = −.26, 95% CI [−.35, −.16], $SE = .05$, $p < .001$; Wave 2: β = −.21, 95% CI [−.30, −.11], $SE = .05$, $p < .001$). As shown in Figure 2b, children's EF score at Wave 1 significantly predicted EF score at Wave 2 (β = .15, 95% CI [.05, .25], $SE = .05$, $p = .003$). In terms of the cross-lagged links, EF at Wave 1 did not predict friendship quality at Wave 2 (*p* = .746). Again, however, friendship quality at Wave 1 significantly predicted higher EF 6 months later (β = .17, 95% CI [.07, .28], $SE = .05$, $p = .001$), beyond the variance explained by prior EF.

Cross-Lagged Analyses: EF Abilities and Peer Status

The longitudinal associations between separate EF components and peer status were also examined through cross-lagged modeling, with peer status as an observed variable. The model fit was acceptable:[5] $\chi^2(4) = 10.02$, $p = .040$, CFI = .99, TLI = .92, RMSEA = .06, 90% CI [.01, .12], SRMR = .02. Results showed significant gender differences in peer status at Wave 1 (β = −.18, 95% CI [−.28, −.08], $SE = .05$, $p < .001$) with girls scoring higher than boys, but there were no significant age effects on peer status at either wave (*p*s ≥ .735). Autoregressive paths indicated that peer status was quite stable across two time points (β = .80, 95% CI [.76, .84], $SE = .02$, $p < .001$). Analyses of enhancement

and suppression as separate abilities yielded some differing results. As shown in Figure 3a, prior enhancement ability did not significantly predict later peer status (*p* = .458), but prior peer status showed a trend toward predicting later enhancement scores at Wave 2 (β = .10, 95% CI [−.00, .19], $SE = .05$, $p = .060$). Furthermore, a significant reciprocal link existed between suppression and peer status: Suppression at Wave 1 positively predicted peer status at Wave 2 (β = .08, 95% CI [.02, .14], $SE = .03$, $p = .008$), and peer status at Wave 1 positively predicted later suppression ability (β = .12, 95% CI [.03, .20], $SE = .05$, $p = .011$).

Analyses of the relations between EF and peer status resulted in a saturated model, $\chi^2(0) = 0.00$, CFI = 1.00, TLI = 1.00, RMSEA = .00, SRMR = .00. Specific path coefficients are depicted in Figure 3b. Overall EF at Wave 1 showed a trend toward significant association with peer status at Wave 2 (β = .06, 95% CI [−.00, .12], $SE = .03$, $p = .058$), and children's peer status at Wave 1 positively predicted later EF (β = .10, 95% CI [.01, .20], $SE = .05$, $p = .039$).[6]

Discussion

The ability to be flexible in one's expressive management—either exaggerating or suppressing one's emotional displays, depending on contextual demands—has been shown to play a central role in adults' psychological adjustment. However, few studies have examined whether the benefits of EF abilities could extend to younger individuals and/or to the quality of social relationships. Furthermore, previous research designs have not allowed for testing the reversed direction of associations, namely whether indices of adjustment predict expressive regulation abilities over time. The present study was designed with the aim of advancing knowledge about expressive flexibility in late childhood and early adoles-

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[5] For this model, the nonsignificant controls of region on peer status were deleted to achieve an acceptable model fit.

[6] As shown in the online supplementary material, models based on the general expressivity ratings were basically the same with the above results, with two exceptions. The two paths (Wave 1 peer status to Wave 2 enhancement, Wave 1 EF to Wave 2 peer status) that currently showed a trend towards significant links were both significant in the expressivity models. That is, Wave 1 peer status positively predicated later enhancement scores (β = .12, 95% CI [.02, .22], $SE = .05$, $p = .015$); Wave 1 EF also significantly predicted higher peer status at Wave 2 (β = .07, 95% CI [.01, .13], $SE = .03$, $p = .028$).

Table 2

Correlations Between the Main Study Variables at Wave 1 and Wave 2

Variable	M	SD	Range	1	2	3	4	5	6	7	8	9
1. W1_Enhancement	.62	1.58	(−4.34, 6.01)	1								
2. W1_Suppression	2.51	2.64	(−4.00, 8.67)	−.11*	1							
3. W1_Expressive flexibility	.16	2.86	(−8.68, 9.32)	.70***	.36***	1						
4. W1_Friendship quality	3.78	.67	(1.60, 5.00)	.13*	.17**	.20***	1					
5. W1_Peer status	.00	1.61	(−6.43, 5.59)	.05	.10*	.09+	.28***	1				
6. W2_Enhancement	.85	1.70	(−4.33, 6.00)	.19***	.06	.18**	.17**	.09+	1			
7. W2_Suppression	3.47	2.61	(−3.00, 10.66)	.09	.48***	.24***	.21***	.18***	−.12*	1		
8. W2_Expressive flexibility	.95	2.94	(−8.66, 8.66)	.22***	.17**	.23***	.21***	.11*	.80***	.20***	1	
9. W2_Friendship quality	3.92	.65	(1.68, 5.00)	.06	.15**	.13*	.62***	.21***	.13*	.16**	.13*	1
10. W2_Peer status	.01	1.61	(−5.73, 4.92)	.06	.16**	.13*	.20***	.81***	.06	.20***	.10+	.16**

$^+ p < .09.$ $\quad * p < .05.$ $\quad ** p < .01.$ $\quad *** p < .001.$

cence. With a two-wave longitudinal design, we explored the age and gender characteristics of EF abilities, as well as their potential bidirectional links with peer relations. To our knowledge, this is the first longitudinal study to directly explore children's EF abilities with a mixed-measurement and multiinformant approach.

Age and Gender Differences in EF Abilities

Participants from primary and junior high schools were followed across 6 months in the present study, thus enabling both short-term longitudinal comparisons and cross-sectional comparisons of EF abilities. Results revealed that children's enhancement and suppression abilities, as well as overall EF, significantly increased from Wave 1 to Wave 2. Contrary to our expectation, however, there were no obvious differences between primary and junior high school students for any of the three scores. This inconsistency potentially reflects the complexity of EF development. The fact that junior high school students did not score higher than younger children might be related to psychosocial and/or biological changes that occur in early adolescence. Generally, children become more efficient at regulating their emotions as they become older (Sabatier et al., 2017), but this is not necessarily a strictly linear growth. Youth may have poorer control over their emotions at the beginning of adolescence than in late childhood, due both to neuro-endocrinological changes that facilitate impulsive behaviors (see Casey, Jones, & Somerville, 2011 for a review) and to the conflict between rapidly growing life dilemmas and gradual attainment of independent regulatory capabilities (Steinberg, 2005). Some previous research has demonstrated a temporary stagnancy of internal emotion regulation around age 13 (Cracco, Goossens, & Braet, 2017; Zimmermann & Iwanski, 2014), which is close to the mean age of the sample in the present study. This trend might apply to the development of EF abilities, as well, but requires further investigation.

Methodological issues might also account for a lack of age-group differences in the present study. In order to make sure children could understand the task, we added practice trials and gave participants detailed instructions, which might minimize potential differences between age groups. Additionally, a practice effect in the EF task is somewhat unavoidable, and the improvement from Wave 1 to Wave 2 might be at least partially caused by greater familiarity and comfort with the task. With only two waves of data, the present study cannot give definite conclusions about

the developmental trend of EF abilities. Future research with additional waves of longitudinal data, collected at regular intervals, would be essential for gaining a more complete picture of the EF development.

In terms of gender differences, girls scored slightly higher than boys on suppression ability. This may be associated with common gender role expectations: Traditional gender norms typically dictate that females are expected to be more relationship-oriented than males, while males are expected to be assertive and even aggressive if needed. Therefore, girls are usually socialized to hide high-intensity and disharmonious emotions, such as anger or inappropriate amusement, in order to avoid hurting interpersonal relationships (Chaplin, Cole, & Zahn-Waxler, 2005). Thus, they may exceed boys on suppression ability. However, considering specific emotion categories is also likely important when it comes to gender differences. For example, it has been shown that boys were more skilled at suppressing submissive emotions, such as sadness and anxiety (Zeman et al., 2006). The established EF paradigm examines abilities to modulate positive versus negative emotional expressions, without distinguishing between different emotions. This might explain why we observed only minor gender differences in suppression ability and no gender differences in enhancement ability or EF.

Longitudinal Links Between EF Abilities and Peer Relations

Both self-reported friendship quality and nominated peer status were measured in the present study, to explore their longitudinal associations with expressive enhancement, suppression, and overall flexibility. Results indicated relatively strong and consistent paths from peer relations to EF abilities. Both friendship quality and peer status at Wave 1 significantly predicted later enhancement and suppression abilities, respectively (although the link from peer status to enhancement was only a strong trend, at $p = .060$), as well as overall EF. Therefore, although previous research has mostly focused on the effects of EF abilities upon adjustment, the present study provided novel evidence for the reversed direction of effects, from individuals' social adjustment to EF. Forming good relationships with peers is a central developmental task in late childhood and adolescence, and failure to do so may result in a multitude of negative outcomes. It has been documented that children's self-regulatory capacities decrease considerably when
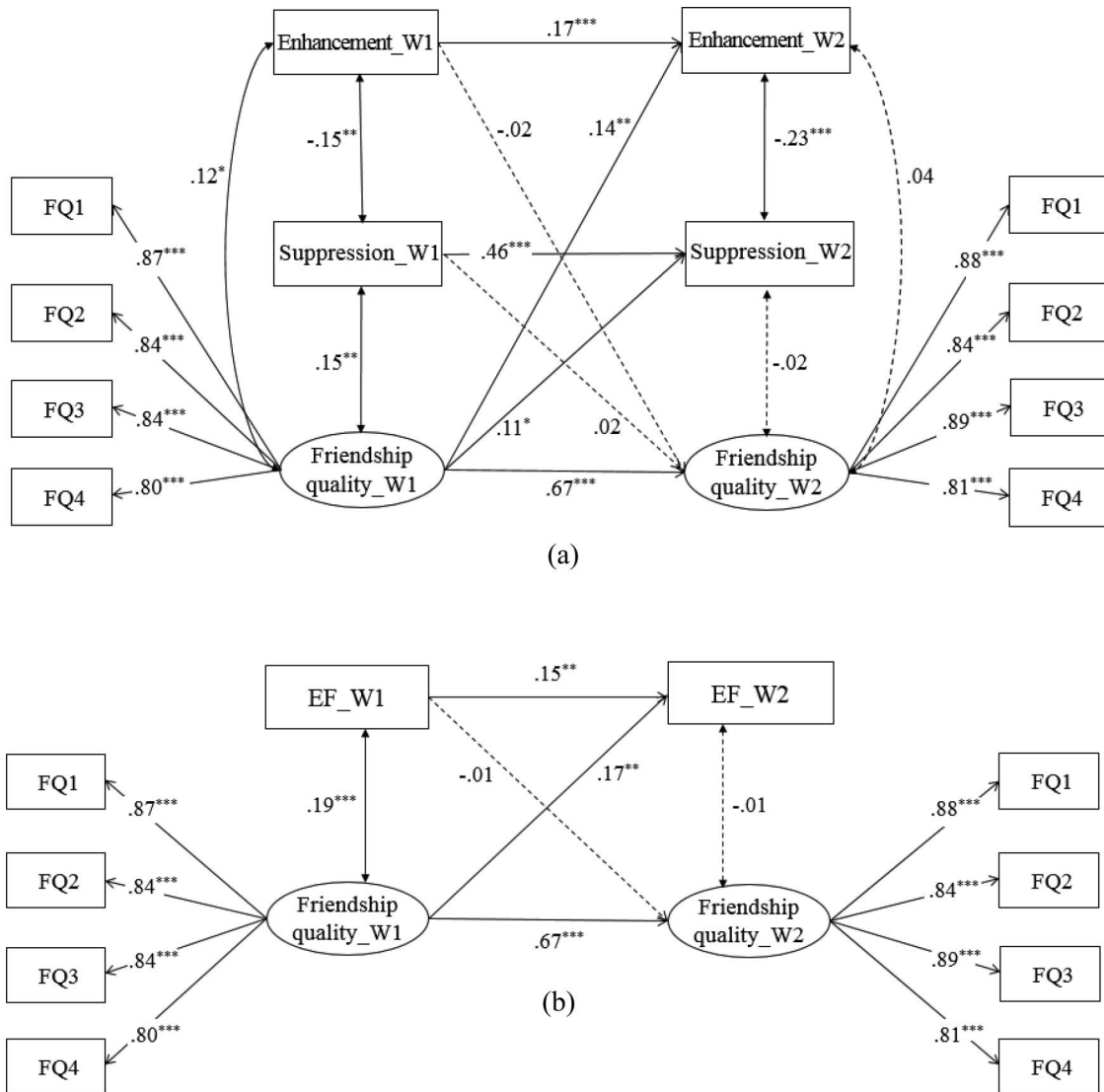
Figure 2. Cross-lagged path models representing the reciprocal relationships between friendship quality with expressive enhancement, suppression, and flexibility. Standardized coefficients are reported. Participant gender, age, and region were included as covariates, but not depicted in the figure for parsimony. FQ1 to FQ4 represent four dimensions of friendship quality: FQ1 = trust and support; FQ2 = companionship and recreation; FQ3 = validation; FQ4 = intimate exchange. * $p < .05$. ** $p < .01$. *** $p < .001$.

they might be negatively evaluated by peers (Guyer et al., 2014). Therefore, both low peer status and poor friendship quality constitute major stressors for children and adolescents, which might complicate the enactment of regulatory behaviors (Baumeister et al., 2005), including EF. In contrast, a good peer context creates a supportive atmosphere for communication, in which children might both be more comfortable with expressing their feelings and more motivated to inhibit expressions that could create difficulties in social interactions. Moreover, these results also supported the theoretical model of interpersonal emotion regulation (IER; Zaki & Williams, 2013) by suggesting the importance of social processes for the modulation of expressive behaviors. Peer relationships appear to be a resource that individuals can utilize in order to achieve emotional goals. Children can exercise expressive skills

and accumulate practical experience during interactions with peers, which in turn might benefit the development of EF.

Contrary to our hypotheses, longitudinal associations from EF abilities to later peer relations differed as a function of both the particular EF component and the type of peer relationship being considered. When examining the separate components of EF, suppression ability at Wave 1 significantly predicted later peer status, but enhancement did not. This is consistent with some previous EF studies, in which suppression ability yielded stronger associations with various aspects of psychological adjustment (Chen et al., 2018; Westphal et al., 2010), compared with enhancement ability. It also fits with findings in the developmental literature that have, to date, more strongly emphasized positive (cross-sectional) links between youths' social relationships and
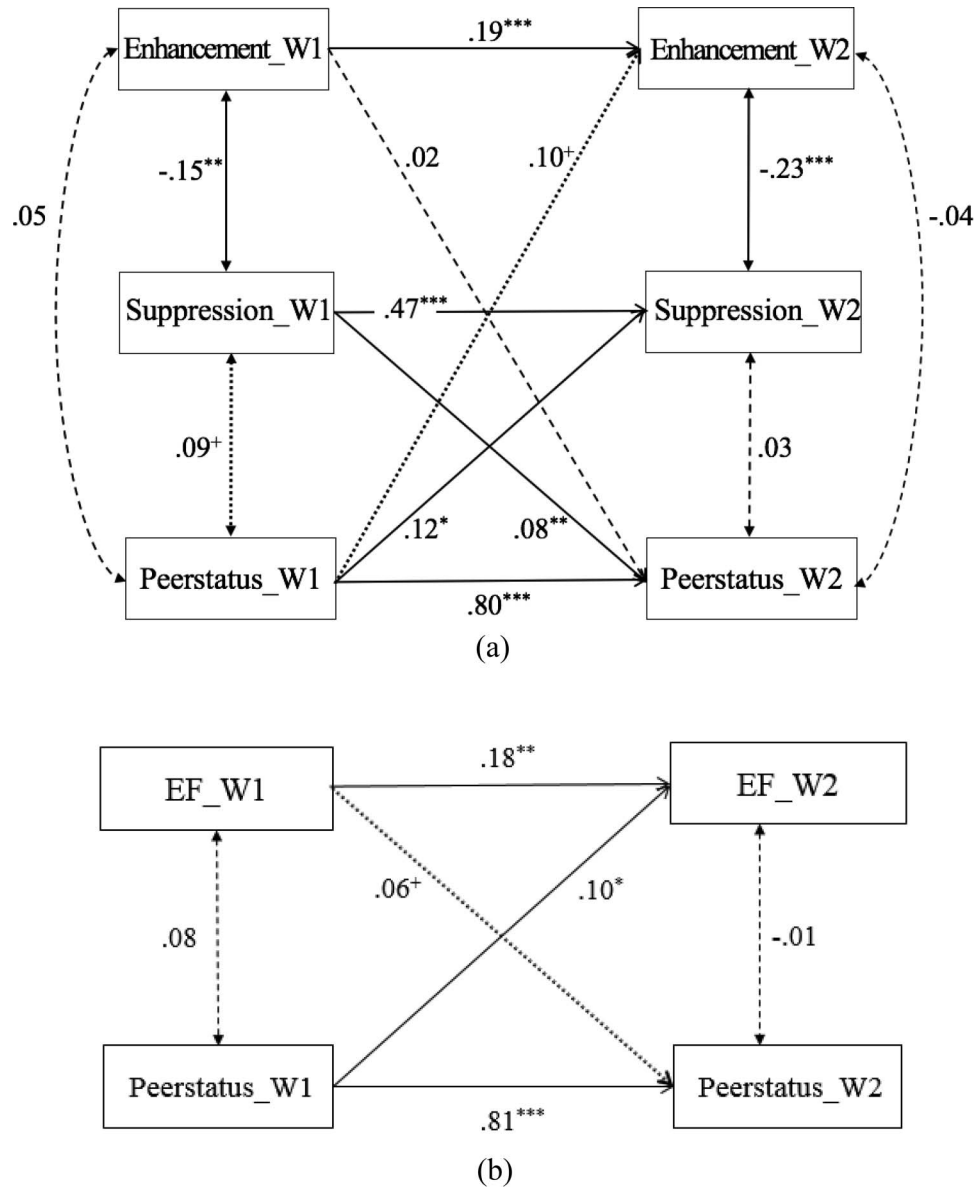
Figure 3. Cross-lagged path models representing the reciprocal relationships between peer status with expressive enhancement, suppression, and flexibility. Standardized coefficients are reported. Participant gender, age, and region were included as covariates, but not depicted in the figure for parsimony. $^+ p < .07.$ $^* p < .05.$ $^{**} p < .01.$ $^{***} p < .001.$

suppression than the exaggeration or enhancement of emotional expressions (e.g., Perry-Parrish et al., 2017; Perry-Parrish & Zeman, 2011). In social interactions, enhancement abilities enable individuals to provide intense and clear emotional expressions to better meet social demands (Chen et al., 2018), which might be more like the "icing on the cake" for forming good relationships. On the contrary, suppression ability is especially crucial for preventing undesirable social outcomes, such as when children are expected to avoid visibly losing their temper, or to avoid boasting after outperforming their counterparts. This is an essential skill for maintaining at least "minimally successful" relationships, and thus might be a stronger

predictor of peer relationship quality. Additionally, the current study was conducted in China, where the dominant social norm is to inhibit emotion expressions in order to promote harmonious social relationships (Matsumoto et al., 2008). Accordingly, children who are good at suppressing emotions may be more favored in social interactions.

Notably, none of the links from enhancement, suppression, or overall EF to later friendship quality were significant, which might be explained by the distinctions between the two peer constructs that we examined. Peer status reflects others' views toward a specific individual, while the measure of friendship quality emphasizes self-perceived conditions of peer relations (Bukowski,

Pizzamiglio, Newcomb, & Hoza, 1996). Because emotional expression is more of an "outward" behavior, it stands to reason that it would first and foremost have an impact on others' impressions in social life. Children who are able to inhibit emotional expressions would be deemed as polite and considerate by peers, and thus be more popular in a broader group. In contrast, a preexisting pair or group of friends might share several similarities (Kandel, 1978), including emotion regulation capabilities (Rose, 2002). This means that, if a child is poor at modulating their expressions as required by the context, it is conceivable that his or her best friend holds similar deficits, or that the youths have already formed a friendship in spite of these deficits. In this case, both of them may not have high expectations on each other's regulatory abilities, thus low EF abilities is no longer a "problem" in their circle and would not affect their relationships.

Overall EF at Wave 1 did not significantly predict later friendship quality or peer status. Models based on coders' overall expressivity ratings, as opposed to separate ratings of positive and negative affect, showed a significant link from Wave 1 EF to Wave 2 peer status (see the online supplementary material). This might be because some seemingly "inappropriate" expressions (e.g., positive responses to negative stimuli) or expressions of emotions with an ambiguous valence (e.g., surprise) still reflect children's EF, to some extent, but would be ignored under the conventional EF scoring method. However, the association was still rather modest in strength. Therefore, generally speaking, the adaptive value of overall EF for social adjustment was not observed. This may be because children's peer relations might be affected by a variety of other factors, such as academic achievement (Chen, Chang, & He, 2003), personality (Jensen-Campbell et al., 2002), or even physical attractiveness (Lerner & Lerner, 1977). In comparison, EF is a relatively advanced skill, which may be of relatively lower importance for social relationships at this stage of development. Additionally, it might be that these capabilities have more short-term impacts, such as on moment to moment interactions, without necessarily translating to long-term benefits. Future studies should examine these possibilities in further detail.

Theoretically, the present study investigated some basic characteristics of children's EF abilities, including potential age and gender differences, thus providing a foundation for future developmental research in this field. Novel investigation of the reciprocal links between EF and peer relations also extends previous research that only focused on the impact of EF on psychological adjustment. In terms of practical implications, the consistent links from peer relations to EF components suggested that problematic peer relationships might be a marker for later expressive regulation problems. Therefore, interventions that help youth with emotion-expressive or self-regulatory difficulties might also consider including components that aim to promote better social interactions.

Strengths and Limitations

Our study held several methodological strengths, including a large sample size with low attrition, a mixed-measurement approach that included objective behavioral observations, and use of both participant self-reports and peer-nominations. Longitudinal comparisons between different age groups provided initial data

related to basic developmental characteristics of children's EF abilities. The longitudinal design also allowed us to examine the overtime direction of associations between EF abilities and peer relations. Moreover, we modified the original EF task used with college-aged and adult participants to make it more suitable for children. Results of the manipulation checks suggest that this task is viable for use with younger individuals, which might be useful for other researchers in the field.

The current study was conducted in China, which is an extension of previous EF research that has largely been conducted with Western samples. We indeed obtained some results that might be explained from cultural perspectives. For example, the finding that only suppression ability significantly predicted peer status (but enhancement ability did not) may be partly due to Chinese cultural display rules that encourage inhibition. Additionally, enhancement scores were lower, and less stable, than suppression scores in the present study, which might indicate that Chinese children are less comfortable with exaggerating their expressive behaviors. We can anecdotally report that participants were sometimes shy about expressing their emotions in an obvious or exaggerated way, especially in front of cameras and in the presence of unfamiliar adults. This situation was more common among rural participants, which might explain why they received significantly lower enhancement and overall EF scores than urban participants. Thus, the task probably underestimated the enhancement abilities that Chinese children might display in more naturalistic settings and around more familiar others. This might point to a need for future studies to examine children's EF abilities using methods that incorporate more naturalistic contexts and interpersonal interactions, in order to enhance ecological validity. Although such explanations are largely conjecture, the results at least reflect the need for more cross-cultural investigations into this observational EF task, as well as for further research on the overtime links between EF abilities and social adjustment among Western children and adolescents.

Some limitations of our research should also be noted. First, although we followed primary school and junior high school students across six months, a focus on late childhood and early adolescence does not provide a complete picture of the developmental course of EF abilities. For example, our suggestion of a dip or plateau phase for EF abilities in early adolescence can only be tested by also including older (middle-to-late adolescent) participants. It is also possible that the majority of EF development happens earlier in childhood, which can only be tested by including younger participants. Therefore, further research with a wider range of age is needed to elaborate upon the full developmental course of EF abilities.

Second, although the longitudinal design enables us to examine the associations between EF components and peer relations over time, its correlational nature still impedes casual interpretations. Future research employing experimental paradigms is necessary to examine causality in these links, which would be beneficial for the design of intervention programs aiming to improve children's EF abilities and/or peer relations. In addition, the present study did not investigate possible behavioral mechanisms accounting for the links from EF abilities to social adjustment, or vice versa. Considering the predictive power of EF abilities was modest in our models, some moderating variables may also exist, such as personality and other emotional abilities. Accordingly, future studies

should continue to explore possible mediating and moderating effects as extensions of the current models.

Finally, for the friendship quality measurement, we asked participants to assess each item according to their relationships with a best friend, but did not ask students to focus on the same person across both waves. This may be a better way to objectively assess their perceptions of social support from peers with whom they feel closer. However, because friendships are still not very stable at this stage, children's best friend might have changed during the two measurements. In this case, they may have referred to different people for the same batch of items. That may also partly explain why the stability of friendship quality was much lower than peer status ($r = .62$ and $.81$, respectively). Moreover, because we did not ask participants to nominate a specific best friend, we could not judge whether participants referred to each other to form reciprocal friendships. This might be an important moderator in the association between EF abilities and friendship quality.

Conclusion

Our research provided detailed investigations into the characteristics of EF abilities in late childhood and early adolescence, as well as their longitudinal associations with peer status and friendship quality. We found that: (a) children's EF abilities showed an upward trend over a 6-month period, but there were no obvious differences between primary and junior high school students; (b) females showed slightly higher suppression abilities than males, while no gender differences existed for enhancement abilities or overall EF; (c) friendship quality at Wave 1 positively predicted later enhancement and suppression abilities, as well as overall EF, but the EF components did not predict later friendship quality; (d) peer status at Wave 1 also positively predicted later suppression and overall EF scores, while only Wave 1 suppression significantly predicted higher Wave 2 peer status. Therefore, links from EF abilities to later peer relations were dependent on the specific EF component and type of relationship being examined. Although previous research has almost exclusively focused on the value of expressive regulation for social relationships, these results mainly highlight the existence of the reverse associations, from social adjustment to EF abilities. From a practical perspective, our findings suggest that encouraging children's positive social relationships might be beneficial for their abilities to effectively and flexibly regulate their expressive behaviors.

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