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What is This?

Emotion Regulation in Adolescence: A Prospective Study of Expressive Suppression and Depressive Symptoms

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Abstract

Cross-sectional studies have shown a positive association between expressive suppression and depressive symptoms. These results have been interpreted as reflecting the impact of emotion regulation efforts on depression. However, it is also possible that depression may alter emotion regulation tendencies. The goal of the present study was to prospectively examine the bidirectional association between habitual use of suppression and depressive symptoms in young adolescents. Participants were 1,753 adolescents (mean age = 13.8 years) who reported their use of suppression and depressive symptoms at two time points with a 1-year interval. Suppression and

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depressive symptoms were correlated within each time point. Depressive symptoms preceded increased use of suppression 1 year later, but suppression did not precede future depressive symptoms. Overall, the findings suggest depressive symptoms may be a potential precursor of habitual use of suppression during adolescence.

Keywords
depression, emotion regulation, puberty, gender

During adolescence, affective situations often result in heightened emotional responses. Although adolescents have a more sophisticated awareness of emotions than do children, in general, the control functions exerted by adolescents are often regarded as inadequate (Casey, Jones, & Hare, 2008). One cause for particular concern is the fact that adolescence is a critical period for the onset of depressive symptoms, especially among girls (Saluja et al., 2004).

It is therefore not surprising that emotion regulation has emerged as an important topic in the study of adolescent depression. Emotion regulation is often defined as the processes responsible for monitoring, evaluating, and modulating emotional reactions in order to accomplish individual goals and facilitate adaptive social functioning (Thompson, 1994). According to Gross (1998), it is this modulation that gives final shape to manifest emotional responses. Recently, the process-oriented model of emotion regulation developed by Gross (1998) has received increased attention in the developmental literature (Betts, Gullone, & Allen, 2009; Chambers, Gullone, & Allen, 2009; Gullone, Hughes, King, & Tonge, 2010). This model distinguishes between emotion regulation strategies based on where they occur in the emotion generative process. Antecedent-focused strategies include efforts to regulate emotions *before* the activation of a full emotional response, while response-focused strategies occur *after* an emotional response has been activated. Response-focused strategies are generally regarded as less effective than antecedent-focused strategies. Two key strategies that have received significant empirical attention are the antecedent-focused strategy of cognitive reappraisal (reinterpreting emotional stimuli in terms that modify the emotional impact) and the response-focused strategy of expressive suppression (inhibiting the behavioral display of emotion).

Drawing on the process-oriented model of emotion regulation (Gross, 1998), in the current study we examine the link between expressive

suppression and depressive symptoms in young adolescents. There are two main reasons for our interest in emotion expression (vs. reappraisal). First, expressive suppression is relatively ineffective at reducing the experience of negative emotion and has physiological (e.g., increased cardiovascular activation), social (e.g., lower social support, less closeness to others), and cognitive (e.g., impaired memory functioning) costs (Butler et al., 2003; Gross, 1998; Richards & Gross, 2000; Srivastava, Tamir, McGonigal, John, & Gross, 2009). Thus individuals who report the habitual use of expressive suppression may be particularly at risk for developing depressive symptoms. Notably, the presence of expressive suppression appears to be more strongly associated with depression than the absence of cognitive reappraisal (Aldao, Nolen-Hoeksema, & Schweizer, 2010). Second, young adolescent girls reported more use of expressive suppression compared to young women, while no differences were found between young adult and adolescent samples for cognitive reappraisal (Gullone et al., 2010). This suggests that expressive suppression might be a relevant strategy to consider in relation to the increasing rates of depressive symptoms in girls during this developmental period.

Cross-sectional studies have found a positive association between self-reports of habitual expressive suppression and depressive symptoms in adults (Gross & John, 2003; John & Gross, 2004) and adolescents (Betts et al., 2009). However, the precise nature of this relation remains unclear. Expressive suppression originally was hypothesized to influence adjustment, but the onset and continuation of depressive feelings may also lead to greater use of suppression. Expressive suppression might provide a short-term function among depressed individuals, temporarily lowering their experience of sadness. There is mixed evidence about whether this is the case (Campbell-Sills, Barlow, Brown, & Hofmann, 2006a; Ehring, Tuschen-Caffier, Schnulle, Fischer, & Gross, 2010; Liverant, Brown, Barlow, & Roemer, 2008). There is also a more interpersonal reason why adolescents who experience depressive symptoms might rely more on suppression: it could be a response to relationship difficulties (e.g., peer rejection, diminished friendship quality). Interpersonal theories of depression (e.g., Coyne, 1976) postulate that depressed individuals' behaviors related to *displaying* negative affect (e.g., irritability, excessive reassurance seeking, corumination) elicit rejection and stress in their relationships that may further exaggerate depressive symptoms. If depressed individuals are aware this is the case, then they may attempt to inhibit their display of negative emotions. Adolescents are increasingly metacognitive and aware of what others are thinking of them. Moreover, adolescence is a developmental period during which the peer context is

especially salient (Larson & Richards, 1991), suggesting adolescents may be particularly likely to try to avoid peer relationship difficulties. Hence, adolescents who experience depressive symptoms may shift from openness to masking their expression of emotions, in *an attempt* to avoid further interpersonal fallout. Ironically, however, both openness and masking the expression of emotions may lead to interpersonal problems (Joiner, 2001).

The goal of the present study was to prospectively examine the potentially bidirectional association between habitual use of expressive suppression and depressive symptoms in young adolescents. We expected to find evidence for both paths. In addition, we examined whether sex moderated the relations between suppression and depressive symptoms. We hypothesized that the relation from suppression to depressive symptoms would be stronger for girls than for boys. Girls value interpersonal connectedness more than boys (Rose & Rudolph, 2006) and, as a result, they may be more susceptible to depressive symptoms when they experience the social costs of using suppression. We did not formulate a sex-specific hypothesis for the other path (i.e., depressive symptoms to suppression). On the one hand, depressed boys may be more likely to use suppression because they experience more peer rejection (Joiner, Alfano, & Metalsky, 1992). On the other hand, depressed girls may be more likely to use suppression because they value interpersonal connectedness more than boys. That is, girls may make greater efforts than boys to avoid the negative interpersonal consequences of expressing depressive symptoms when experiencing disapproval.

Method

Participants and Procedure

Participants in the present study were drawn from the first two waves of a large-scale longitudinal project examining mental health and health habits in Dutch youth (Larsen, Otten, & Engels, 2009). Participants were recruited from 7 randomly selected secondary schools in suburban ($N = 3$) and urban ($N = 4$) areas from three regions in the Netherlands. Data collection took place at the schools. A total of 90 classes (on average 13 per school) participated, with an average size of approximately 25 students per class. The data obtained by this way of sampling are called complex survey data. Complex because the data have a multilevel structure with students nested within classes and classes nested within schools. Participants were informed that participation was voluntary and confidential. Parents were informed about the study through the mail, and were asked to respond via telephone or email

if they did not want their child to participate in the study. Of the 2,216 students targeted, 92.6% (*n* = 2,051) initially participated. Approximately 1 year later, 85.5% of these participants (*n* = 1,753: 890 boys and 863 girls) completed surveys again at the second wave. All participants attended regular secondary education and were in either first or second grade (equivalent to Grades 7 and 8 in the United States) at baseline (mean baseline age = 13.8, *SD* = 0.7). Our sample had a relatively high level of education compared to a national population (Centraal Bureau voor de Statistiek [CBS], 2006): 19.4% attended low secondary education (compared to 43.3% in the national population), 20.7% intermediate secondary education (compared to 26.2% in the national population), 24.5% intermediate to high secondary education (compared to 18.3% in the national population), and 35.4% attended the highest level of secondary education possible in the Netherlands (preuniversity education; compared to 12.2% in the national population). Most of the participants were born in the Netherlands (95.5%) and had at least one parent who was born in the Netherlands or in another European country (93.4%).

A logistic regression analysis showed that attrition was significantly predicted by sex (OR = .70, $p < .01$, 95% CI = [.54, .91]), age (OR = 1.32, $p < .01$, 95% CI = [1.09, 1.59]), ethnicity (OR = 1.81, $p < .001$, 95% CI = [1.33, 2.47]), family structure (OR = 1.47, $p < .05$, 95% CI = [1.05, 2.06]), educational level (OR = 0.91, $p < .05$, 95% CI = [0.84, 0.98]), and depressive symptoms (OR = 1.03, $p < .001$, 95% CI = [1.02, 1.05]). Females, younger adolescents, those of Dutch origin, those living with two biological parents, and those with lower levels of depression were overrepresented in the longitudinal sample. No differences were found between dropouts and completers for expressive suppression.

Measures

The Dutch version of the Center for Epidemiological Studies Depression (CES-D) inventory was used to measure depressive symptoms. The CES-D (Radloff, 1977) is a 20-item self-report scale originally developed to measure depressive symptoms in the general population. Participants used a 4-point response format to indicate how frequently in the past week each depressive symptom had occurred. The CES-D has shown good internal consistency and test-retest reliability among adolescent populations (Roberts, Andrews, Lewinsohn, & Hops, 1990). Cronbach's alpha was .86 at Time 1 and .87 at Time 2.

Expressive suppression was assessed with the four-item suppression scale of the Emotion Regulation Questionnaire (ERQ; Gross & John, 2003). The

ERQ suppression scale has shown good reliability, consistent evidence of unifactorial structure, and convergent and discriminant validity in both younger and older adults. An example of an ERQ suppression item is "I control my emotions by not expressing them." In accordance with prior research on adolescence, we used a 5-point rating scale instead of the 7-point rating scale used for adults (Gullone et al., 2010). Adolescents completed the questionnaire in the presence of a researcher (or graduate student) and could ask questions about any unclear item. Cronbach's alpha coefficients were .76 at Time 1 and .69 at Time 2. Because this latter value is somewhat low, we also computed Jöreskog's rho (also known as McDonalds omega), a better estimate of the true reliability than Cronbach's alpha (Sijtsma, 2009); it was .78, suggesting an acceptable level of reliability.

Statistical Analyses

To examine the longitudinal model of relations between expressive suppression and depressive symptoms over time, we applied Structural Equation Modeling (SEM) using MPLUS (Muthén & Muthén, 1998-2007). We applied SEM with latent variables rather than path analysis with manifest variables because in SEM the error parts of the latent variables are separately modeled, leading to more valid results. In path analysis with manifest variables the error parts are included in the scores on the manifest variable, contaminating the estimated path coefficients with these error parts. We estimated expressive suppression with the four original items. We decided not to use the original 20 items as indicators for depressive symptoms to avoid a large number of parameters to be estimated (Yang, Nay, Hoyle, 2010) or to avoid estimation problems (Sass & Smith, 2006). The longitudinal model presented below would require the estimation of 194 parameters. Representing depressive symptoms by 4 parcels (subsets of items) of 5 items each, the number of parameter estimates is reduced to 82. The complexity of the model is reduced, leading to less or no estimation problems (Sass & Smith, 2006). We constructed parcels optimally reflecting the original 1-factor structure. Items were allocated to parcels according to the magnitude of the factor loadings, with each parcel containing items with higher and lower factor loadings reflecting the original factor structure (Huver, Engels, Vermulst, & de Vries, 2007). The items of the parcels at baseline (T1) were identical to those at the second assessment (T2).

The longitudinal model tested included age, sex, education level, ethnicity, and family structure as covariates. All four latent variables (i.e., depressive symptoms and expressive suppression at the two assessment points) were

regressed on these covariates. Error terms of identical indicators over time were allowed to correlate.

Within the model, respondents were nested within schools and class-rooms. To correct for possible nonindependence of the data, we applied the COMPLEX procedure in MPLUS to get unbiased estimates of the standard errors of the parameters for schools and for classrooms separately. We compared these results to those performed without this correction procedure and found no differences in significance levels of the parameter estimates between the three solutions. This result is supported by the very low values of the intraclass correlations of the dependent variables in the model (varying between .00 and .05 for schools and between .01 and .05 for classrooms). We present results corrected for nesting within classrooms.

The COMPLEX procedure uses the Robust Maximum Likelihood (MLR) estimation method and is also robust to nonnormality of the data. Missing data were handled using the Full Information MLR-estimator. In this way, all available information in the data was utilized. Model fit was reported in terms of chi-square, p, Root Mean Squared Error of Approximation (RMSEA), and the Comparative Fit Index (CFI) of Bentler (Marsh, Balla, & McDonald, 1988). A nonsignificant chi-square value is typically an indicator of good model fit. However, with a large sample size, chi-square is less appropriate as an indication for model fit because it will often be significant (Marsh et al., 1988). In these cases, RMSEA and CFI are more appropriate fit measures, indicating a good model fit if RMSEA <.05 and CFI >.05. Prior to the final SEM-analyses, we tested the measurement part of the longitudinal model. This factor model showed a good fit with $\chi^2(90) = 226.71$, $p = .001$, CFI = .987, and RMSEA = .027. The factor loadings of the parcels of depression varied from .77 to .83 and of the items for suppression from .53 to .87.

Possible structural differences between boys and girls were examined via multiple group testing with age, education level, ethnicity, and family structure as covariates. A default baseline model was created in MPLUS by constraining the factor loadings and intercepts of the measurement part to be equal for boys and girls. The chi-square of this baseline model was compared with the chi-square of the model with the four structural weights and the two correlations were constrained to be equal. The MLR-estimation method computes robust chi-square values. These robust values were first rescaled to standard chi-square values before the chi-square difference test was performed. If the chi-square difference was found to be significant, the parameters of the model would be constrained to be equal one-by-one to detect which parameters were significant between groups.

Table 1. Means and Standard Deviations for Depressive Symptoms and Expressive Suppression at Baseline (Time 1) and 1 Year Later (Time 2), and Differences (*t*- and *d*-values) Between Boys and Girls.

|	Boys		Girls		Difference statistics	
	$\overline{M}$	SD	$\overline{M}$	SD	t	d
Baseline						
Depressive symptoms	7.17	5.74	10.43	8.62	−9.33*	−0.44
Expressive suppression	10.19	3.19	9.16	3.21	6.75*	0.31
1-year follow-up						
Depressive symptoms	6.86	5.98	10.73	8.47	−10.96*	0.52
Expressive suppression	10.06	3.28	9.18	3.40	5.51*	0.26

Note: There were no changes in depressive symptoms or expressive suppression from Time 1 to Time 2, also not for the whole sample.
*$p < .001$.

Results

Preliminary Analyses

Almost 16% of the adolescents reported at least some depressive symptoms (using CES-D $\geq$ 16) and nearly 6% of these reported moderate to severe depressive symptoms (CES-D $\geq$ 24). Table 1 presents the means and standard deviations for depressive symptoms and expressive suppression at both time points for boys and girls separately, as well as the results of *t* tests examining sex differences. At both time points, girls reported higher levels of depressive symptoms (small to medium effect sizes) and boys reported higher levels of expressive suppression (small effect sizes). In our longitudinal model we found similar associations for sex with depressive symptoms (T1: $\beta = .23$, $p < .001$; T2: $\beta = .14$, $p < .001$) and with expressive suppression (T1: $\beta = -.17$, $p < .001$; T2: $\beta = -.11$, $p < .001$). A lower education level was significantly correlated with more severe depressive symptoms at T1 ($\beta = -.09$, $p < .001$) and more expressive suppression at T1 ($\beta = -.08$, $p < .01$). Ethnic minorities showed more depressive symptoms (T1: $\beta = .08$, $p < .01$) and more suppression (T1 $\beta = .10$, $p < .001$) than adolescents who had parents born in the Netherlands or another European country. Those from nonintact families showed more depressive symptoms (T1: $\beta = .14$, $p < .001$) than adolescents from intact families (living with two biological parents). No significant relations with the covariate "age" were found; however, it should be noted that
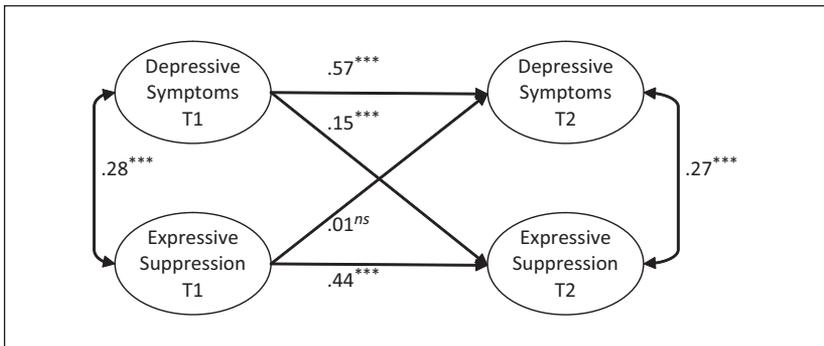
Figure 1. Longitudinal model testing the reciprocal relations between expressive suppression and depressive symptoms.
Note: $\chi^2(150) = 429.17$, $p < .001$, CFI = .974, RMSEA = .030. (1) ***$p < .001$, *ns* not significant; (2) Longitudinal relations are standardized regression weights; (3) Cross-sectional relations are correlations between latent variables at T1 and between disturbance terms at T2.

the age range in our sample was relatively small, with most of the participants (87.7%) falling between the ages of 13 and 15.

Testing the Reciprocal Longitudinal Model

Figure 1 shows the model of reciprocal relations between expressive suppression and depressive symptoms. The covariates sex, age, education level, ethnicity, and family structure are not depicted in the Figure, but they were included in the model. The longitudinal model fitted the data well, with CFI = .975 and RMSEA = .030. Depressive symptoms and expressive suppression were rather stable over time, with path coefficients around .5. There were positive cross-sectional associations between depressive symptoms and expressive suppression at both time points. The cross path prediction from depressive symptoms at baseline to expressive suppression 1 year later was significant ($\beta = .15$, $p < .001$). In contrast, the cross path prediction from expressive suppression at baseline to depressive symptoms 1 year later was not significant ($\beta = .01$). The β's of the two cross paths were significantly different to each other. The fit of the model constraining the two cross paths to be equal was significantly higher, $\chi^2(151) = 446.11$, than the unconstrained model fit, $\chi^2(151) = 429.17$]: the difference of the two rescaled chi-square values was $\Delta\chi^2(1) = 15.31$, $p < .001$. Overall, these results provide support for the model where depressive symptoms precede increased use of expressive suppression.

Moderating effects of sex were examined with multiple group testing. The baseline model fit was $\chi^2(300) = 599.51$, $p < .001$, CFI = .970, and RMSEA = .032, and the constrained model fit (four beta weights and two correlations constrained to be equal) was $\chi^2(306) = 609.12$, $p < .001$, CFI = .969, and RMSEA = .031. The difference of the two rescaled chi-square values ($\Delta\chi^2(6) = 9.71$, $p = .137$) was not significant. Thus the model presented in Figure 1 did not significantly differ for boys and girls.

Discussion

This study was the first to prospectively examine the association between habitual use of expressive suppression and depressive symptoms among adolescents over time. Rather than finding the expected reciprocal relationship between suppression and depressive symptoms during early-to-mid adolescence, there was only support for a unidirectional relation from depressive symptoms to suppression. Specifically, depressive symptoms were associated with increased use of expressive suppression 1 year later, but expressive suppression did not precede later depressive symptoms. The effect size of the relation between depressive symptoms and suppression 1 year later was small, but it was consistent for both girls and boys. Although this study does not allow for causal conclusions (as the observed effects could be caused by third variables), results suggest that depressive symptoms may lead to greater use of suppression.

In our introduction we suggested two reasons explaining why depressive symptoms may lead to greater use of suppression. First, depressed individuals might use suppression as a short-term functional strategy to temporarily lower the experience of sadness. There is some experimental evidence to suggest that expressive suppression does lower negative emotion among depressed individuals (Liverant et al., 2008). However, other experiments have found that suppression is ineffective for down-regulating negative emotions among recovered-depressed patients and individuals with anxiety or mood disorders (Campbell-Sills et al., 2006a; Ehring et al., 2010). Moreover, existing studies have only focused on adult samples. Thus future research is needed to determine whether expressive suppression lowers the short-term experience of sadness among adolescents who experience depressive symptoms.

Second, adolescents who experience depressive symptoms may suppress their emotions for more interpersonal reasons. In line with interpersonal theories of depression, recent work provides evidence for the idea that corumination (the excessive discussion of problems with close others) is one transactional

process that connects internalizing problems and interpersonal stressors over time (Hankin, Stone, & Wright, 2010). We theorized that after experiencing interpersonal stressors (peer rejection, diminished friendship quality), depressed adolescents might shift from open styles of expressing their emotions (e.g., corumination) to masking their expression of emotions, in an attempt to avoid further interpersonal fallout. There is some evidence to suggest that depressed individuals judge their negative emotions as less socially acceptable than do nondepressed individuals (Campbell-Sills, Barlow, Brown, & Hofmann, 2006b). In addition, appraising one's emotions as unacceptable has been shown to mediate the relationship between negative emotion intensity and use of suppression (Campbell-Sills et al., 2006b). It is thus possible that after experiencing peer relationship difficulties in response to displaying negative affect, depressed adolescents develop the belief that their emotions are not socially accepted and, as a result, suppress their emotions in an attempt to prevent further social exclusion.

On a related note, negativity in cognitive style and resulting feelings of hopelessness following depressive symptoms (Jacobs, Reinecke, Gollan, & Kane, 2008) might make individuals believe that others will not respond well to their feelings or that supportive reactions from others may not make them feel any better. As a result, these individuals may become emotionally guarded and be more likely to suppress expression of emotions. Future research is needed to test these different mechanisms.

Our lack of evidence for the relation from expressive suppression to depressive symptoms over time may suggest that suppression is not an important factor determining the development of depressive symptoms among young adolescents. However, it should be noted that, although we focused on a developmental period during which expressive suppression appears to be a relevant emotion regulation strategy, many of the participants were at a stage during which girl's rates of depressive symptoms were just beginning to rise. Thus future research with a longer term follow-up is needed to examine whether expressive suppression in young adolescents might precede the development of depressive symptoms later in adolescence. In addition, although we did not find support for the idea that habitual use of suppression in *general* leads to greater depressive symptoms, it is possible that suppression of specific emotions may be more relevant. Along these lines, two prior longitudinal studies, focusing on inhibition of specific negative emotions, have shown links between the suppression of anger (but not sadness) and increased depressive symptoms over time in children (Zeman, Shipman, & Suveg, 2002) and adults (Bromberger & Matthews, 1996). Future studies are needed to similarly disentangle the effect of suppression of specific emotions

on depressive symptoms in (young) adolescents. Notably, there is a strong link between emotion suppression and reduced expression of both negative and positive emotion (Gross & John, 2003). Evidence that a lack of *positive* emotion expression precedes preadolescents' depressive symptoms (Feng et al., 2009) suggests that the suppression of positive emotion may predict increased depressive symptoms during (pre)adolescence. Although one recent study did *not* find evidence for a link between a unitary latent emotion dysregulation factor and later developing depressive symptoms, rumination and dysregulated anger and sadness expression were associated with more depressive symptoms over time in early adolescents (McLaughlin, Hatzenbuehler, Mennin, & Nolen-Hoeksema, 2011). Thus *specific* maladaptive emotion regulation strategies (e.g., rumination, corumination, suppression of anger, and lack of positive emotion expression) may be associated with increases in depressive symptoms over time. Identifying whether (and how) these specific maladaptive and other generally more adaptive strategies are potential precursors for depressive symptoms during adolescence is an important topic for future research, especially given the potential it has to help understand the rapid increase in the rate of depressive symptoms among adolescent girls.

Several limitations of our research design are worth noting. First, we relied on a relatively select, homogeneous sample: the participants were all healthy adolescents who attended a high level of education and were mostly from the same age range and cultural background. In addition, attrition analyses showed that adolescents with somewhat lower levels of depressive symptoms and with some specific sociodemographic characteristic (i.e., intact families) were overrepresented in the longitudinal sample. Consequently, findings from the present study may not generalize to less healthy populations or other populations that differ with regard to race, ethnicity, education, or depressive symptoms.

A second limitation concerns our use of only two measurement waves. Although this study was the first to offer insight into the reciprocal relation between expressive suppression and depressive symptoms, a design with a greater number of measurement occasions would have allowed for more complex data-analytic approaches, including growth-mixture models that enable the search for subgroups of change patterns (Muthen & Muthen, 2000). A longitudinal study commencing during preadolescence would be particularly interesting in this regard to track the codevelopment of expressive suppression and depressive symptoms across this key developmental transition to early adolescence.

Finally, we relied solely on self-report measures. Shared-method variance may have increased correlations among variables. Future research might benefit from using a semistructured interview to assess depression. This would also be beneficial because relatively high depressive symptoms on the CES-D might reflect negative emotionality or some factor other than clinical depression. Moreover, future research may provide more insight into emotion regulation processes if multi-informant methods and approaches, such as observations and a dynamic systems approach, are employed (Granic & Hollenstein, 2003)

In summary, although the results provided no evidence for an association between suppression and subsequent increases in depressive symptoms, depressive symptoms were associated with increased subsequent use of expressive suppression among adolescent girls and boys. Future research should continue to examine the relationship between emotion regulation and depressive symptoms, including different emotion regulation strategies, possible mediating variables, and different time lags.

Declaration of Conflicting Interests

Funding

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