Attentional Biases in Currently Depressed Children: An Eye-Tracking Study of Biases in Sustained Attention to Emotional Stimuli

Ashley Johnson Harrison

Department of Psychology, Binghamton University (SUNY) and Department of Psychiatry and Human Behavior, Brown University Medical School

Brandon E. Gibb

Department of Psychology, Binghamton University (SUNY)

Cognitive theories state attentional biases contribute to the development and maintenance of depression. Like depressed adults, there is growing evidence for the presence of attentional biases to sad stimuli in depressed youth. Although the direction of this bias among children remains unclear, preliminary evidence indicates attentional avoidance of sad stimuli in children. This is the first known sudy to use eye-tracking to investigate the exact nature of attention biases among depressed children. To assess sustained attention, the current study used eye-tracking and a passive viewing task in which children viewed a series of four facial expressions (angry, happy, sad, neutral) presented simultatiously for 20 s on a computer screen. The current study compared the attentional allocation of currently depressed children ($n = 19$; M age $= 11.21$) to a group of never depressed children ($n = 22$; M age $= 10.82$). Consitent with earlier research with children, we found that children with current major or minor depression, compared to children with no history of depression, exhibited attentional avoidance of sad facial stimuil as well as some evidence for preferential attention to happy faces. This study provides additional evidence that although depressed children demonstrate mood congruent attentional biases like that observed depressed adults, the nature of these biases may reflect attentional avoidance of sad stimuli, rather than preferential attention.

According to cognitive theories, attention biases contribute to the development and maintenance of depression (Clark, Beck, & Alford, 1999). Depressed and at-risk individuals are hypothesized to exhibit preferential attention to depression-relevant stimuli (e.g., sad faces), specifically difficulty disengaging attention from these stimuli. There is now a relatively large body of research supporting this hypothesis (for a review, see Gotlib & Joormann, 2010; Peckham, McHugh, & Otto, 2010). Although there is evidence that depressed children and adolescents also exhibit attentional biases specifically for sad faces, the direction of this bias remains unclear. For example, one study shows that depressed adolescents exhibit *preferential attention* toward sad faces (Hankin, Gibb, Abela, & Flory, 2010), whereas another study found that currently depressed and at-risk children exhibited *attentional avoidance* of sad faces (Gibb, Benas, Grassia, & McGeary, 2009). This latter finding is consistent with what is observed in the infant literature, in which there is clear evidence that infants of depressed mothers spend less time looking at their mothers than do infants of nondepressed mothers (Boyd, Zayas, & McKee, 2006). Similarly, infants look less at facial expressions of sadness than other emotions such as happiness or anger (Montague & Walker-Andrews, 2001). It appears,

Correspondence should be addressed to Ashley Johnson Harrison, E.P. Bradley Hospital, Developmental Disorders Research Program, 1011 Veterans Memorial Parkway, East Providence, RI 02915. E-mail: ashley.harrison@uga.edu

therefore, that there may be developmental differences in the nature of the attentional bias exhibited in response to sad faces.

Theorists have suggested that infants avoid looking at sad faces as a mood regulation strategy and there is evidence that the extent to which this is unsuccessful (i.e., the extent to which infants do look at sad faces), the infants become sad themselves (Termine & Izard, 1988). This is consistent with broader theories of emotion regulation (e.g., Gross, 1998, 2014) in which attentional deployment is highlighted as a key early mechanism of emotion regulation. Therefore, one could propose a developmental progression in which (a) at-risk infants are able to avert their gaze from sad faces to effectively regulate their mood; (b) depressed children are able to avert their gaze from sad faces, but this is no longer sufficient to effectively regulate their mood (perhaps because of more covert processes such as rumination that effectively keep them from fully disengaging); and (c) depressed adults are no longer able to avert their gaze from sad faces, leading to the consistent finding of increased sustained attention to sad faces in the adult literature. Although this discussion suggests the presence of voluntary emotion regulation strategies, it is also possible that the process is more involuntary, as both voluntary and involuntary disengagement strategies (which would include attentional avoidance) are associated with increased depression in children (e.g., Dunbar et al., 2013; Jaser, Champion, Dharamsi, Riesling, & Compas, 2011; Sontag & Graber, 2010).

Regardless of whether this reflects a voluntary or involuntary process, clarifying the nature of attentional biases observed in depressed children may have important implications for theory and intervention. In terms of the theoretical implications, the presence of attentional avoidance of, rather than preferential attention toward, sad faces in depressed children would suggest that these biases reflect a different process in children than in adults. Therefore, cognitive theories, which were initially developed to explain depression in adults and which focus exclusively on difficulties disengaging attention from depression-relevant stimuli, would need to be modified to account for developmental differences in the nature of attentional biases. In terms of clinical implications, there is growing interest in using computer-based attention-bias modification protocols to treat different forms of psychopathology. This approach has shown significant promise in the treatment of anxiety (for reviews, see Hakamata et al., 2010; Hallion & Ruscio, 2011), and there is preliminary evidence that this treatment approach may help to alleviate depressive symptoms (e.g., Wells & Beevers, 2010). However, if depressed children do indeed exhibit the opposite pattern of attentional bias to depression-relevant stimuli than

depressed adults, these interventions will need to be fundamentally altered before being applied to children.

Before drawing any firm conclusions, however, one must consider the method in which attentional biases have typically been assessed in children (and in adults). The overwhelming majority of studies that have investigated attentional biases in depression have used a modified dot-probe task (cf. MacLeod, Mathews, & Tata, 1986), in which preferential attention for emotional faces (e.g., sad vs. neutral) is inferred when participants' reaction time to the probe are faster when the probe appears in the location of the emotional face than in the location of the neutral face. That is, it is assumed that reaction times to the probe will be faster if one's attention is already allocated to that side of the computer screen. This paradigm rests upon the somewhat tenuous premise that reaction times provide an accurate index of attentional allocation. Another limitation is that, at best, it provides only a snapshot of attentional processes—where attention was allocated at the precise moment the probe appeared (e.g., 1,000 ms after stimulus onset). Another limitation of the dot probe is that the task is highly controlled and may not provide the best index of how attention will be deployed in the real world where individuals are often presented with a number of social cues varying in emotional valence (or facial expression).

Given these limitations, researchers have recently begun to examine attentional biases in more unconstrained tasks. For example, using a passive viewing task in which participants are simply asked to look at a series of four emotional stimuli presented on the screen simultaneously with a relatively long stimulus presentation duration (e.g., 20 or 30 s), one can assess patterns of attentional allocation with an eye-tracker in a more ecologically valid way with fewer constraints than in tasks such as the dot probe (Hermans, Vansteenwegan, & Eelen, 1999). In addition, given the longer stimulus presentation duration, one can more easily assess biases in sustained attention, which is the key component of attention hypothesized to be disrupted in depressed and depression-prone individuals. To date, studies combining passive viewing tasks and eye-tracking have supported the hypothesis that depressed adults exhibit greater sustained attention to depression-relevant stimuli than does the nondepressed group (Eizenman et al., 2003; Kellough, Beevers, Ellis, & Wells, 2008), with one study suggesting that depressed adults also exhibit less sustained attention to positive stimuli than did a never depressed group (Kellough et al., 2008). What remains unclear is, when attentional biases are assessed in a free viewing task, with patterns of attentional allocation directly measured with an eye-tracker over a relatively long stimulus duration, will the biases exhibited by depressed children mirror those observed

in adults (preferential attention toward sad stimuli) or align with the attentional avoidance of sad stimuli observed in an earlier dot probe study of children (Gibb et al., 2009) and the broader infant literature (e.g., Boyd et al., 2006; Montague & Walker-Andrews, 2001).

The goal of the current study, therefore, was to examine biases in sustained attention among currently depressed children using a passive viewing task. Based on previous research in adults and youth, we predicted that depressed children would exhibit attentional biases specifically for sad faces. However, given the mixed findings in youth samples just described, we made no hypotheses regarding the direction of this bias (preferential attention vs. attentional avoidance).

METHOD

Participants

Participants in this study were 40 children 8 to 14 years of age. The depressed group consisted of 19 children with a current *Diagnostic and Statistical Manual of Mental Disorders* (4th ed. [*DSM–IV*]; American Psychiatric Association, 1994) diagnosis of major or minor depressive disorder. Minor depression was operationalized as a constellation of depressive symptoms that was one symptom short of the *DSM–IV* diagnostic criteria for major depressive disorder (MDD). The duration and impairment criteria were identical to those specified for MDD. The depressed group was 53% male and had a mean age of $11.21 (SD = 2.02)$. This group was 79% Caucasian, 16% Biracial, and 5% American Indian participants. Within this group, 16 participants were diagnosed with current MDD, and three were diagnosed with minor depressive disorder. In addition, four participants (21%) in this group had a current comorbid anxiety disorder (posttraumatic stress disorder, separation anxiety, or generalized anxiety disorder), one of whom also had a past diagnosis of separation anxiety. The never depressed group consisted of 21 children with no current or past diagnosis of any depressive disorder; participants were 52% male and had a mean age of 10.86 $(SD = 1.65)$. This group comprised 86% Caucasian, 5% African American, and 10% Asian/Asian American participants. Within this group, no participants had a current diagnosis of anxiety, and only one child had been diagnosed with an anxiety disorder in the past (panic disorder). Rule out criteria for both groups included intellectual disability or developmental delays as reported by the child's parent.

Measures

The Schedule for Affective Disorders and Schizophrenia for School-Age Children-Present and Lifetime Version (K-SADS-PL; Kaufman et al., 1997) was used to assess for current and past *DSM-IV* Axis I mood and anxiety disorders in the children. Both parents and children participating in the study completed the depression and anxiety sections of the K-SADS interview independently. Diagnostic conclusions were achieved in consensus meetings with a highly trained clinical diagnostician and a Ph.D.-level clinical psychologist. Discrepancies between parent and child report were reconciled using the best estimate approach, which has demonstrated reliability and validity for integrating reports from multiple informants (Klein, Dougherty, & Olino, 2005; Klein, Ouimette, Kelly, Ferro, & Riso, 1994). A second interviewer coded a subset of 10 interviews and interrater reliability for depressive diagnoses was excellent ($\kappa = 1.0$).

Children's attentional biases for facial displays of emotion were assessed using a passive viewing task that quantified continuous attentional allocation over a relatively long (20 s) free-viewing trial. Facial stimuli for this task were drawn from the Karolinska Directed Emotional Faces (Calvo & Lundqvist, 2008; Lundqvist, Flykt, & Ohman, 1998) stimulus set consisting of actors exhibiting happy, sad, angry, and neutral facial expressions. Each trial started with the presentation of a fixation cross presented for 1 s, followed by the appearance of four faces from the same actor representing happy, sad, angry, and neutral expressions that were presented for 20 s in a quadrant arrangement on the screen (upper left, upper right, lower left, lower right). In each trial, faces depicting each emotion were presented randomly in each of the four different quadrants, and each emotional expression occurred with equal frequency in all four quadrants. To decrease the face validity of the task and to serve as a control of visual attention, trials were also included in which only neutral expressions were presented. The task consisted of a total of 20 trials (12 trials depicting four different emotions and eight trials depicting neutral only stimuli). Participants were asked to freely view the stimuli with the only rule being that their attention needed to remain on the screen for the entire time. Children sat a distance of 65 cm away from the computer monitor and each of the four facial stimuli was 13 cm high × 12 cm wide, with 20 cm between the center of each stimulus horizontally and 16 cm vertically. Attentional allocation during each trial was measured using a Tobii T60 infrared eye-tracker and then isolated to each predefined AOI. Similar to Kellough et al. (2008), summary statistics were calculated from the eye-tracking data for each 4-s epoch (five total) of each trial in order to assess trajectories of attention. The key variables of interest obtained from this task represent the proportion of time within each epoch the participant focused on each of the four facial expressions, averaged across each of the trials containing emotional stimuli.

Procedure

Children were recruited from the community through the use of newspaper and online advertising and through advertising at local community mental health agencies. Families responding to advertisements underwent a phone screen to learn more about the study and to determine initial eligibility for participation in the study. The study was approved by the Binghamton University Internal Review Board. Children were invited to participate in the study if their parent reported they were experiencing ongoing significant sadness/irritability or no lifetime history of persistently experiencing negative affect. Internal Review Board–approved consent and assent were obtained for all participating parents and children prior to participation. Children and parents agreeing to participate in the study participated in a one-time assessment that took approximately 2 hours and were provided monetary compensation for their time. Once consent was obtained, the parent was administered the K-SADS-PL interview by a trained clinician and the child completed the passive viewing task in a separate room. After completing the K-SADS-PL with the parent, the same interviewer then administered the K-SADS-PL to the child.

RESULTS

We used a 2 (group: depressed, never depressed) × 4 (emotion: angry, happy, sad, neutral) × 5 (epoch: 1–5) linear mixed model to examine differences in trajectories of attentional allocation during the passive viewing task. The dependent variable in these analyses was the proportion of time within each epoch the participant focused on each of the four facial expressions. We found a significant Group × Emotion interaction, $F(3, 336.97) = 9.59$, $p < .001$, although the three way Group × Emotion × Epoch interaction was nonsignificant, $F(12, 135.69) = 0.34$, $p = .98$.[1] Examining the form of the Group × Emotion interaction, we tested for group differences in proportion of time spent looking at each emotion type, collapsing across epoch. We found significant group differences in the proportion of time spent looking at happy faces, $F(1, 35.30) = 4.67$, $p = .04$, $r_{effect\ size} = .34$, and sad faces, $F(1, 36.85) = 4.34$, $p = .04$, $r_{effect\ size} = .32$, but not angry faces, $F(1, 37.69) = 1.25$, $p = .27$, $r_{effect\ size} = .18$, or neutral faces, $F(1, 37.49) = 0.46$, $p = .50$, $r_{effect\ size} = .11$. These findings are presented in Figure 1. As can be seen in the figure, currently depressed children spent significantly more time looking

FIGURE 1   Group differences in the proportion of time fixating on each emotion. $^*p < .05$.

at happy faces and significantly less time looking at sad faces than did nondepressed children.[2]

Finally, exploratory analyses were conducted to determine whether any of the group differences were moderated by children's age, gender, or race (Caucasian vs. other racial/ethnic groups), or the presence of an anxiety disorder. None of these moderation analyses was significant. We should also note that, although the depression group difference in attention to sad faces was maintained when statistically controlling for each of these other variables, the group difference in attention to happy faces was reduced to nonsignificant.[3]

DISCUSSION

The primary goal of this study was to investigate biases in sustained attention to emotional stimuli in currently depressed children. Using a passive viewing task with attentional allocation assessed with an eye-tracker, we predicted that depressed children would exhibit attentional biases specifically for sad facial stimuli. However, we made no hypotheses regarding the direction of this

---

[1]Although we present here the results with Epoch treated as a fixed, categorical variable, we also examined Epoch as a continuous (linear or nonlinear) influence in these models. In all instances, interactions with depression group were nonsignificant.
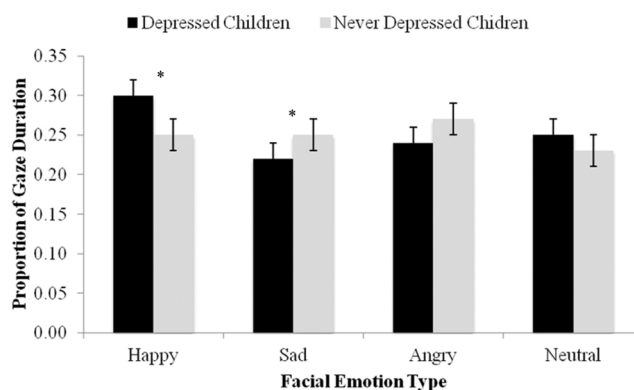
[2]In this study, only three of the participants included in the MDD group met criteria for minor depressive disorder. As noted in the Method section, these participants had four rather than the five required symptoms for as *DSM* MDD diagnosis. To determine whether the results presented were unduly affected by the inclusion of these three children, we reconducted each of our analysis focusing only on children meeting criteria for MDD. The Group × Emotion interaction remained significant, $F(3, 312.77) = 8.25$, $p < .001$. As before, the group difference in attention to sad faces was significant, $F(1, 34.37) = 4.57$, $p < .04$, though the group difference in attention to happy faces was reduced to nonsignificant with this smaller sample size, $F(1, 32.78) = 3.19$, $p = .08$.

[3]The specific results for the nonsignificant group difference in attention to happy faces with the inclusion of each covariate are child age, $F(1, 33.41) = 3.35$, $p = .08$, $r_{effect\ size} = .30$; gender, $F(1, 33.06) = 3.57$, $p = .06$, $r_{effect\ size} = .31$; race, $F(1, 33.50) = 2.08$, $p = .16$, $r_{effect\ size} = .24$; and current anxiety, $F(1, 33.59) = 2.41$, $p = .13$, $r_{effect\ size} = .26$.

bias. Indeed, a key question in this study is whether children would exhibit the same pattern of preferential attention toward sad stimuli observed in depressed adults across tasks (dot probe and passive viewing) or whether they would exhibit attentional avoidance of sad faces as has been observed in a previous dot probe task in children (Gibb et al., 2009) as well as in studies of infants (e.g., Termine & Izard, 1988). Consistent with this latter research, we found that depressed children exhibited less sustained attention to sad faces than did never depressed children. In addition, currently depressed children exhibited preferential sustained attention to happy faces compared to never depressed children, though this effect did not survive the test of robustness when additional covariates were added to the model. The pattern of these attentional biases was consistent across the entire duration of the 20 s trials, consistent with the hypothesis that these findings reflect biases in more sustained attentional processing (at least longer than 20 s) rather than more time limited attentional biases.

The current results add to a growing body of research suggesting that, although the focus of attentional biases may be the same in depressed adults and children (i.e., specific to sad faces rather than other facial expressions of emotion), the nature or function of the bias may differ. The current findings, combined with those of earlier research (e.g., Gibb et al., 2009; Montague & Walker-Andrews, 2001; Termine & Izard, 1988), suggest that depressed children and at-risk infants may avoid looking at sad faces as an attempt at emotion regulation, which may be voluntary or involuntary. Although this strategy appears to be effective in infants (e.g., Termine & Izard, 1988), it is clearly not so in depressed children. As noted in the introduction, this may reflect a developmental progression in which (a) at-risk infants are able to avert their gaze from sad faces to effectively regulate their mood; (b) depressed children are able to avert their gaze from sad faces, but this is no longer sufficient to effectively regulate their mood (perhaps because of more covert processes such as rumination that effectively keep them from fully disengaging); and (c) depressed adults are no longer able to avert their gaze from sad faces leading to the consistent finding of increased sustained attention to sad faces in the adult literature. Obviously, the current study cannot definitively address this question; however, future research should seek to include a broader age range of participants to more formally evaluate whether the form, function, and utility of attentional allocation to sad faces biases varies across development in depressed and at-risk individuals.

In this light, we should also note that two studies suggest the presence of preferential attention to sad faces in at-risk children (children of depressed mothers; Joormann, Talbot, & Gotlib, 2007; Kujawa et al., 2011). In contrast to the current study, these studies focused on risk as defined by a positive history of major depression in the children's mothers rather than directly examining the link between attentional biases and children's own levels of depression. Indeed, the Joormann et al. (2007) study focused on never disordered daughters of mothers with a history of recurrent major depression. Given the significant risk for psychopathology in this population, there is always the possibility that daughters ages 8 to 14 who have no history of any Axis I disorder are particularly resilient in some way. However, these mixed findings suggest that the nature of attentional biases in depressed children is far from clear and requires additional research.

We should also highlight our finding regarding attentional biases for happy faces. However, because the preferential attention bias for happy faces observed among depressed children did not remain significant after controlling for age, gender, ethnicity, or the presence of a current anxiety disorder, this finding should be interpreted with caution. That said, the magnitude of the group difference remained in the medium range ($r_{effect\ size}$ = .24–.31) even in the presence of the covariates suggesting that it may be significant with a slightly larger sample. The finding is also with Gross and Thompson's (2007) theory of emotion regulation, according to which children would not only shift their focus away from negative stimuli but also shift attention toward positive stimuli. Although this finding that depressed children may preferentially attend to happy stimuli contrasts with research using the dot probe task in which the biases exhibited are typically specific to sad faces (for reviews, see for reviews, see Gotlib & Joormann, 2010; Joormann, 2009; Peckham et al., 2010), this difference in findings may be due to a difference in the design of the two tasks. Specifically, for the dot probe task, an emotional stimulus (e.g., sad face) is always paired with a neutral stimulus. Therefore, any measure of bias toward or away from the emotional stimulus is always relative to the neutral stimulus. In contrast, with the passive viewing task, each of the four stimulus types are presented simultaneously (angry, happy, sad, and neutral faces in the current study), so there is greater competition among valence types of attentional resources. It will be important for future research to determine the extent to which attentional biases in depression are dependent on, versus independent of, other sources of sources of information in the environment.

This study exhibited a number of strengths including the focus on children with a current depressive diagnosis as well as the use of eye-tracking to assess trajectories of attentional allocation to emotional stimuli over a relatively long trial duration (20 s). There are also several limitations, however, which provide avenues for future research. One potential limitation is that our depressed group included children with either major or minor depression. Although this is not uncommon in studies

of children, inclusion of less severe depression may add heterogeneity to the depressed group. This said, we used a fairly conservative definition of minor depression in the current study, requiring the same duration and impairment criteria as MDD but allowing one less Criterion B symptom. A second limitation is the study's cross-sectional design, which precluded any causal conclusions regarding the role of attentional biases in the development and maintenance of depression. Future studies are needed to better understand the role of attentional biases in the initial development of depression, maintenance of the disorder, and impact on risk of relapse. Another potential limitation is that, like most prior studies of attentional biases, the stimuli used in this study consisted of adult faces and the stimulus set itself was validated on adults (Calvo & Lundqvist, 2008). Future research would benefit from the use of stimuli developed and validated specifically for youth samples (e.g., the NIMH Child Emotional Faces Picture Set; Egger et al., 2011). Finally, although analyses were conducted to investigate the influence of potential moderators such as age, gender, and ethnicity, given the small sample this study was insufficiently powered to adequately investigate these questions. Future studies with larger, more diverse samples are needed to more definitively determine whether the obtained results are consistent across gender, ethnic, and age groups.

In summary, results from this study provide additional support for the hypothesis that depressed children exhibit attentional avoidance of, rather than preferential attention toward, sad faces. This pattern is the opposite of that observed in adults. To the extent that it reflects a true developmental difference in the expression of attentional biases, it suggests that current cognitive models of attentional biases will have to be revised. Although there is preliminary evidence that children's attentional avoidance of sad faces predicts prospective changes in their depressive symptoms over time (Gibb et al., 2009), future research is needed to determine whether these biases actually contribute to the initial development of the disorder.

FUNDING

REFERENCES

American Psychiatric Association. (1994). *Diagnostic and statistical manual of mental disorders* (4th ed.). Washington, DC: Author.

Boyd, R., Zayas, L., & McKee, M. (2006). Mother–infant interaction, life events and prenatal and postpartum depressive symptoms among urban minority women in primary care. *Maternal and Child Health Journal*, 10, 139–148.

Calvo, M. G., & Lundqvist, D. (2008). Facial expressions of emotion (K–DEF): Identification under different display-duration conditions. *Behavior Research Methods*, 40, 109–115.

Clark, D. A., Beck, A. T., & Alford, B. A. (1999). *Scientific foundations of cognitive theory and therapy of depression*. Hoboken, NJ: Wiley.

Dunbar, J. P., McKee, L., Rakow, A., Watson, K. H., Forehand, R., & Compas, B. E. (2013). Coping, negative cognitive style and depressive symptoms in children of depressed parents. *Cognitive Therapy and Research*, 37, 18–28.

Egger, H. L., Pine, D. S., Nelson, E., Leibenluft, E., Ernst, M., Towbin, K. E., & Angold, A. (2011). The NIMH Child Emotional Faces Picture Set (NIMH-ChEFS): A new set of children's facial emotion stimuli. *International Journal of Methods in Psychiatric Research*, 20, 145–156.

Eizenman, M., Yu, L. H., Grupp, L., Eizenman, E., Ellenbogen, M., Gemar, M., & Levitan, R. D. (2003). A naturalistic visual scanning approach to assess selective attention in major depressive disorder. *Psychiatry Research*, 118, 117–128.

Gibb, B. E., Benas, J. S., Grassia, M., & McGeary, J. (2009). Children's attentional biases and 5–HTTLPR genotype: Potential mechanisms linking mother and child depression. *Journal of Clinical Child and Adolescent Psychology*, 38, 415–426.

Gotlib, I. H., & Joormann, J. (2010). Cognition and depression: Current status and future directions. *Annual Review of Clinical Psychology*, 6, 285–312.

Gross, J. J. (1998). Antecedent- and response-focused emotion regulation: Divergent consequences for experience, expression, and physiology. *Journal of Social and Personality Psychology*, 74, 271–299.

Gross, J. J. (2014). Emotion regulation: Conceptual and empirical foundations. In J. J. Gross (Ed.), *Handbook of emotion regulation* (2nd ed., pp. 3–20). New York, NY: Guilford.

Gross, J. J., & Thompson, R. A. (2007). Emotion regulation: Conceptual foundations. *Handbook of Emotion Regulation*, 3, 24.

Hakamata, Y., Lissek, S., Bar-Haim, Y., Britton, J. C., Fox, N. A., Leibenluft, E., . . . Pine, D. S. (2010). Attention bias modification treatment: A meta-analysis toward the establishment of a novel treatment for anxiety. *Biological Psychiatry*, 68, 982–990.

Hallion, L. S., & Ruscio, A. M. (2011). A meta-analysis of the effect of cognitive bias modification on anxiety and depression. *Psychological Bulletin*, 137, 940–958.

Hankin, B. L., Gibb, B. E., Abela, J. R. Z., & Flory, K. (2010). Selective attention to affective stimuli and clinical depression among youth: Role of comorbid anxiety and specificity of emotion. *Journal of Abnormal Psychology*, 119, 491–501.

Hermans, D., Vansteenwegan, D., & Eelen, P. (1999). Eye movement registration as a continuous index of attention deployment: Data from a group of spider anxious students. *Cognition and Emotion*, 13, 419–434.

Jaser, S. S., Champion, J. E., Dharamsi, K. R., Riesling, M. M., & Compas, B. E. (2011). Coping and positive affect in adolescents of mothers with and without a history of depression. *Journal of Child and Family Studies*, 20, 353–360.

Joormann, J. (2009). Cognitive aspects of depression. In I. H. Gotlib & C. L. Hammen (Eds.), *Handbook of Depression: Second edition* (pp. 298–321). New York: Guilford.

Joormann, J., Talbot, L., & Gotlib, I. H. (2007). Biased processing of emotional information in girls at risk for depression. *Journal of Abnormal Psychology*, 116, 135.

Kaufman, J., Birmaher, B., Brent, D., Rao, U., Flynn, C., Moreci, P., . . . Ryan, N. (1997). Schedule for Affective Disorders and Schizophrenia for School-Age Children-Present and Lifetime Version (K-SADS-PL): Initial reliability and validity data. *Journal of the American Academy of Child and Adolescent Psychiatry*, 36, 980–988.

Kellough, J. L., Beevers, C. G., Ellis, A. J., & Wells, T. T. (2008). Time course of selective attention in clinically depressed young adults: An eye tracking study. *Behaviour Research and Therapy*, *46*, 1238–1243.

Klein, D. N., Dougherty, L. R., & Olino, T. M. (2005). Toward guidelines for evidence-based assessment of depression in children and adolescents. *Journal of Clinical Child and Adolescent Psychiatry*, *34*, 412–432.

Klein, D. N., Ouimette, P. C., Kelly, H. S., Ferro, T., & Riso, L. P. (1994). Test–retest reliability of team consensus-estimate diagnoses of Axis I and II disorders in a family study. *American Journal of Psychiatry*, *151*, 1043–1047.

Kujawa, A. J., Torpey, D., Kim, J., Hajcak, G., Rose, S., Gotlib, I. H., & Klein, D. N. (2011). Attentional biases for emotional faces in young children of mothers with chronic or recurrent depression. *Journal of Abnormal Child Psychology*, *39*, 125–135.

Lundqvist, D., Flykt, A., & Ohman, A. (1998). *The Karolinska Directed Emotional Faces–KDEF* (CD-ROM). Department of Clinical Neuroscience, Psychology section, Karolinska Institute Stockholm, Sweden.

MacLeod, C., Mathews, A., & Tata, P. (1986). Attentional bias in emotional disorders. *Journal of Abnormal Psychology*, *95*, 15–20.

Montague, D. P. F., & Walker-Andrews, A. S. (2001). Peekaboo: A new look at infants' perception of emotion expressions. *Developmental Psychology*, *37*, 826–838.

Peckham, A. D., McHugh, R. K., & Otto, M. W. (2010). A meta-analysis of the magnitude of biased attention in depression. *Depression and Anxiety*, *27*, 1135–1142.

Sontag, L. M., & Graber, J. A. (2010). Coping with perceived peer stress: Gender-specific and common pathways to symptoms of psychopathology. *Developmental Psychology*, *46*, 1605–1620.

Termine, N. T., & Izard, C. E. (1988). Infants' responses to their mothers' expressions of joy and sadness. *Developmental Psychology*, *24*, 223–229.

Wells, T. T., & Beevers, C. G. (2010). Biased attention and dysphoria: Manipulating selective attention reduces subsequent depressive symptoms. *Cognition and Emotion*, *24*, 719–728.