Learning and Individual Differences xxx (2015) xxx–xxx

Contents lists available at ScienceDirect

Learning and Individual Differences

journal homepage: www.elsevier.com/locate/lindif

Externalizing behaviors and learning from text in primary school students: The moderating role of mood

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ARTICLE INFO

Article history:
Received 6 November 2014
Received in revised form 11 April 2015
Accepted 15 August 2015
Available online xxxx

Keywords:
Mood induction
Externalizing
Behaviors
Learning from text
Primary school children

ABSTRACT

Previous research indicates that externalizing problems and negative mood can impair learning. However, the interaction between these variables in predicting learning from text is not well understood. This study examined the moderating role of negative mood in the association between externalizing behaviors and learning from text in primary school children.
Fifth graders (N = 160) were randomly assigned to either a negative or a neutral mood condition. Students were mood-induced by watching a video-clip. Subsequently, they read a text, answered a post-reading knowledge question, and reported on their externalizing behaviors.
Ordinal logistic regression and simple slope analysis revealed that more externalizing behaviors were related to poorer learning gain in students in the negative mood condition, but not in those in the neutral mood condition. These results show that negative mood moderates the effect of externalizing behaviors on learning from text, thus giving important hints for practice in educational settings.

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1. Introduction

The ability to acquire knowledge from a written text is central to successful learning in most, if not all, academic subjects. The comprehension of an informational text results from the reading process as well as from the reader's skills and characteristics. Moreover, the link between reading achievement and behavioral problems is well documented (Cain & Bignell, 2014; Gray, Carter, Briggs-Gowan, Jones, & Wagmiller, 2014; Sarver et al., 2012), and estimates of co-occurrence between externalizing behaviors and academic underachievement in school-age children can reach 50% (Gray et al., 2014). Early externalizing problems play a particularly important role in the emergence of reading difficulties and in the development of learning from texts skills in the school years (Gray et al., 2014). The reciprocal effects between externalizing behaviors and academic achievement can be moderated by students' characteristics, such as self-esteem (Zimmermann, Schütte, Taskinen, & Köller, 2013). However, with very few exceptions (Bohn-Gettler & Rapp, 2011; Broughton, Sinatra, & Nussbaum, 2013), little attention has been devoted to the influence of affective states, which lie outside of explicit control, on students' ability to read and comprehend a text. To our knowledge, no previous study has investigated the role of everyday mood variations in the relation between externalizing behaviors and learning from text.

In this study, we focused on students at the end of their primary education. This period is particularly interesting because at this age, students prepare themselves to enter a period of major transitions characterized by greater requests in academic efforts (i.e., transition to secondary school) and striking body and behavioral changes (i.e., onset of puberty). The presence of changes, challenges, or stressors at this stage of the child's life may accentuate or trigger externalizing behaviors, which can seriously affect learning in this phase of students' academic path (van Batenburg-Eddes & Jolles, 2013).

Student misbehavior and conduct problems in the classroom represent a common experience in everyday school life and are a frequent cause of concern for parents and teachers. These externalizing behaviors only in rare exceptions are of clinical relevance; more often they represent a phase of transitional development. Yet, there are important individual differences, and while some students experience only sporadic or transitory externalizing problem behaviors, others engage in these acts more frequently and may face emotional and learning consequences (Breslau, Breslau, Miller, & Raykov, 2011; Gray et al., 2014). In the long term, externalizing problem behaviors can lead not only to low engagement in academic activity, but also to school drop-out and low achievement in postsecondary education (Finn, Fish, & Scott, 2008).

In daily life, students are continuously facing learning tasks and activities in various moods (Pekrun & Linnenbrink-Garcia, 2014). It is a common experience for students having to read a text or a sentence again because their emotional state affects the ability to process and comprehend the written material. In recent years, the influence of emotion on learning has been empirically investigated through experimental studies based on mood induction, which addressed the effects of mood on cognitive processing.

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http://dx.doi.org/10.1016/j.lindif.2015.08.023
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Please cite this article as: Scrimin, S., et al., Externalizing behaviors and learning from text in primary school students: The moderating role of mood, *Learning and Individual Differences* (2015), http://dx.doi.org/10.1016/j.lindif.2015.08.023

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Research has shown that normal mood fluctuations may positively affect, impair, or have no effect on different aspects of cognition (e.g., Mitchell & Phillips, 2007; Yang & Yang, 2014). Studies using negative mood induction show that a negative emotional state is associated with a reduction in cognitive functioning (Brand, Reimer, & Opwis, 2007; Scrimin, Mason, & Moscardino, 2014), which may be explained by a reduction of information processing capacity (Ellis & Ashbrook, 1988). More specifically, recent studies have focused on the effects of mood on various learning performances (Brand et al., 2007; Bohn-Gettler & Rapp, 2011). For example Brand et al. (2007) have shown that negative mood impairs transfer effects and learning, while Bohn-Gettler and Rapp (2011) found that happy-induced participants generated more text-based inferences while reading texts, compared with sad and neutral-induced students. In our own work, we also recently found that undergraduate students in a negative mood processed and comprehended a scientific text worse than students in a positive or neutral mood (Scrimin & Mason, 2015).

Hence, externalizing behaviors and normal mood variations have separately been shown to affect learning from text. However, whether these variables can influence each other and, in turn, affect the process of learning from a written text, has yet to be investigated.

The aim of the present study was to examine the relationship between externalizing behaviors, negative mood, and learning from text. Based on the extant literature, we expected students in a negative mood to acquire less knowledge from a written informational text compared with students in a neutral mood. We also hypothesized to find a negative association between externalizing behaviors and learning from text. Furthermore, we examined the possible moderating role of negative mood in the link between students' externalizing behaviors and learning from text. Given the lack of studies on this issue, no a priori hypothesis was formulated.

2. Method

2.1. Participants

Participants were 160 (74 male) primary school students attending 5th grade (age: $M = 10.14$; $SD = .35$). Students were recruited through local primary schools in a middle-sized town located in northeastern Italy. All students were Italian first language speakers and had no certified learning disorders. Most students were from middle class families and reported a moderate (24.5%) or high (75%) score on the Family Affluence Scale (FAS; Boyce, Torsheim, Currie, & Zambon, 2006), with an overall mean score of 6.58 ($SD = 1.50$, range 3–10). Parents' average years of schooling were 13.48 years ($SD = 2.94$, range = 8–20), with 79.1% of mothers reporting they were employed outside the home. Participants were randomly assigned to either a Negative (n = 80) or a Neutral (n = 80) mood induction condition. Parental written permission (students brought the letters home from school) and child verbal assent were required for participation; in addition, written informed consent was obtained from school principals. The study was also approved by the Institutional Review Board.

2.2. Reading material and learning measures

The text described in 254 words (in Italian) how a suction cup works and the role played by air pressure, also with the support of an image.

Knowledge about the working mechanism of a suction cup at pretest and posttest was assessed through a written explanation: "How would you explain to a child of your age why a suction cup remains attached to the wall?". Explanations were scored from 0 to 3 according to their degree of correctness and completeness. Examples of coding were as follows: a. "When we press the suction cup against the wall, you squeeze out the air from under it. Then, the rubber that the cup is made out of tries to return to its original shape. This causes an area of lower pressure under the cup, and the higher external atmospheric pressure pins it to the window"(scored 3); b. "When we squeeze the suction cup against the wall all the air comes out from under it. Then this air is responsible for keeping the cup glued to the wall" (scored 2); c. "When you press the suction cup against the wall, the air comes out and the cup remains glued to the wall" (scored 1); and d. "The air between the suction cup and the wall keeps the cup glued to the wall" (scored 0). All answers were scored by two independent raters who were blind to the participants' mood induction condition. Interrater reliability was .90 at pretest, and .88 at posttest, as revealed by Cohen's *k*. Disagreement was resolved through discussion.

2.3. Externalizing problems

Students' externalizing problems were measured via the Strengths and Difficulties Questionnaire (SDQ; Goodman, 1997). The SDQ is a 25-item questionnaire measuring children's hyperactivity, conduct problems, emotional problems, problems with peers, and prosocial behavior. Items are scored on a 3-point scale, with 0 = not true, 1 = somewhat true, and 2 = certainly true. A total difficulties score can be generated by the sum of scores from all the scales except the prosocial scale (Goodman, 1997). Goodman, Lamping, and Ploubidis (2010) recently reported theoretical and empirical support for combining the SDQ's emotional and peer subscales into an 'internalizing' subscale, and the behavioral and hyperactivity subscales into an 'externalizing' subscale. Because we were interested in studying hyperactivity and behavioral problems, in this study we used the externalizing subscale. In the current sample, the internal consistency coefficient for this scale, measured through Cronbach's Alpha, was .79.

2.4. Mood induction procedure and mood measure

2.4.1. Mood induction

To induce negative and neutral moods, participants viewed a 12-min video clip containing three scenes from child-animated cartoons or documentaries. Specifically, students in the negative mood group viewed three sad four-min clips derived by Disney animated cartoons: "Bambi", "The Lion King", and "Red and Toby". It should be noted that in the negative mood induction video, we choose to include parts of well-known cartoons in order not to expose children to particularly disturbing scenes. Participants in the neutral condition viewed three four-min clips with National Geographic documentaries on the formation of glaciers, the prairie's plant life, and the stalagmite process of formation. This procedure is similar to the one used in numerous studies that have elicited a mood with video-clips (e.g., Mitchell & Phillips, 2007; Scrimin et al., 2014).

2.4.2. Mood assessment

Before and after the mood induction procedure, participants completed the Positive and Negative Affect Scale for Children (PANAS-C; Laurent et al., 1999), a 30-item questionnaire assessing current mood (positive and negative affect) in children and adolescents. This scale requires participants to rate a series of adjectives describing how they feel at the moment (e.g., Positive— Enthusiastic, Negative—Afraid) on a 5-point scale ranging from 1 (not at all) to 5 (extremely). The list of emotional terms can be grouped into two subsets for assessing positive and negative affect. In the present sample, the alpha coefficient was .87 for the negative affect scale, and .84 for the positive affect scale.

2.5. Control variables

Other participant characteristics that could interfere with learning from text were also measured.

2.5.1. Demographics

Students reported on their age and gender. In addition, family socioeconomic status was assessed via the Family Affluence Scale (FAS), a

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four-item measure developed and validated in the HBSC study (Boyce et al., 2006). It includes four indicators of family affluence: Family car ownership, unshared rooms, number of computers at home, and time spent on holiday in the last 12 months. Responses were summed, and the total score (ranging from 0 to 9) was used as a continuous variable it order to control for SES (Boyce et al., 2006).

2.5.2. Reading comprehension ability

It was measured using the Italian test for upper secondary school, which evaluates reading comprehension of two texts, one narrative and the other informational (Cornoldi, Pra Baldi, & Friso, 2010). For the purpose of the present study, only the informational text was used. Cronbach's reliability coefficient for this sample was .81.

2.5.3. Verbal working memory capacity

It was measured using the Italian version of Daneman and Carpenter's (1980) Reading Span Test, which evaluates the simultaneous processing and storage of unrelated information and is, therefore, considered a complex span text (Pazzaglia, Palladino, & De Beni, 2000).

3. Procedure

Students were individually assessed in a quiet room of the school during class hours. The assessment lasted one hour and started with the self-report measure of mood and the prior knowledge question. Once the pre-test was completed, students watched the 12-minute video clip aiming to induce either a negative or a neutral mood. To avoid possible expectancy effects that could compromise the outcomes of the investigation, students were blinded to the expected mood change and to the study aims. After viewing the clip, participants again completed the mood measure and were asked to read and study the text explaining how a suction cup works. They could use as much time as they needed to read the text. Students were then asked to complete a couple of short questionnaires (assessing socio-demographic characteristics and frequency of externalizing behaviors), which worked as distractors, before measuring post-reading knowledge with the same explanatory question asked in the pretest on the working mechanism of a suction cup. Last, reading comprehension ability and verbal working memory capacity were assessed. Before leaving the room, students were debriefed taking five minutes to make small-talk asking three basic questions: 1) what they liked more about the session, 2) what was the worst thing they had to do; and 3) how they felt at the moment. Last, they were dismissed thanking them for their participation.

4. Results

4.1. Preliminary analyses

First, data were tested for skewness, kurtosis, and outliers; all continuous dependent variables were normally distributed, hence no transformations were necessary.

Preliminary analyses were performed to examine whether the two different mood induction groups differed in relation to demographic variables (i.e., age, gender, socioeconomic status). Moreover, the two groups were tested for potential differences in the pre-induction phase in relation to prior knowledge about how a suction cup works, reading comprehension ability, verbal working memory capacity, and reported mood (i.e., PANAS-C). Pearson's Chi-square for categorical variables and independent samples t-tests for continuous variables revealed a fairly homogenous distribution of all variables across the two groups, with all *ps* > .2 (all data are available in the supplementary material).

To assess the effectiveness of the mood induction procedure as measured by the PANAS-C, two repeated measures analyses of variance were performed for the positive and negative affect scales. Students' mood as assessed before and after the two mood induction conditions is presented in Table 1.

Table 1
Mean positive and negative affect scores on the PANAS-c before and after the two mood induction procedures and group comparisons.

	Pre-induction *mean* (*SD*)	Post-induction *mean* (*SD*)	*t*	*df*	*p*
Negative mood induction (n = 79)					
Negative affect	15.05 (5.59)	17.16 (6.32)	−4.020	78	<.001
Positive affect	44.25 (8.59)	41.51 (11.63)	4.104	78	<.001
Neutral mood induction (n = 80)					
Negative affect	14.99 (4.97)	13.19 (4.17)	2.784	79	.010
Positive affect	43.33 (8.13)	43.45 (9.66)	−2.745	79	.023

When the dependent variable was the positive affect scale, the analysis yielded a significant main effect of mood induction group, $F(1, 159) = 3.50$, $p = .032$, $\eta_p^2 = .03$, as well as a significant mood induction group × time interaction, $F(1,159) = 4.85$, $p = .009$, $\eta_p^2 = .04$. Moreover, positive affect decreased in the negative-mood group and remained fairly stable in the neutral-mood group (see Table 1). When the dependent variable was the negative affect scale, repeated measures analysis of variance yielded a significant main effect of mood induction group, $F(1, 159) = 5.30$, $p = .006$, $\eta_p^2 = .04$, and a significant mood induction group × time interaction $F(1, 159) = 13.30$, $p < .001$, $\eta_p^2 = .10$. Furthermore, paired *t* tests indicated that negative affect increased dramatically from the pre to the post-induction phase in the negative-mood group, and only slightly in the neutral-mood group (see Table 1). Based on these results, the mood induction procedure was deemed to be effective.

Levels of externalizing behaviors did not differ between the negative ($M = 7.41$, $SD = 3.42$, range = 0–19) and neutral ($M = 6.75$, $SD = 3.34$, range = 0–19) mood groups.

4.2. Effects of externalizing behaviors and mood on learning from text

The aim of the following analysis was threefold: (1) To examine the relationship between mood induction group and learning from text; (2) to test the relationship between externalizing behaviors and learning from text; and (3) to explore whether mood moderates the association between externalizing problems and learning from text. To obtain a measure of learning from text, the difference between the score for the post-reading explanation and the score for the pre-reading explanation was computed (Δ = score in the post-reading explanation − score in the pre-reading explanation). Learning gain (Δ) varied between −1 and 3 (with the following percentage distribution: −1 = 1.9%, 0 = 26.9%, 1 = 40.6%, 2 = 25%, 3 = 5.6%), and overall indicated that students' knowledge increased (71.2% of Δ > 0). Next, we used ordinal logistic regression. This analysis is appropriate in the presence of a dependent variable measured on an ordinal scale, which represents a proxy of an underlying continuous variable. The model was run in three stages described below, and the analysis was conducted using the MASS package (Venables & Ripley, 2002) of R software (R Core Team, 2013). The first step of the model included only mood induction group as a predictor variable.

As can be seen in Table 2, negative mood was associated with poorer learning from text. In the second step, externalizing behaviors were added to the model. The results showed that more externalizing behaviors and negative mood were associated with poorer learning from text.

The final step explored the moderating influence of mood on the relationship between externalizing behaviors and learning from text. Thus, this step included the interaction term externalizing behaviors × mood-induction group. As can be seen in Table 2, this interaction was statistically significant, indicating that mood- induced state moderated the influence of externalizing behaviors on learning from text (see Fig. 1).

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Table 2
Summary of hierarchical ordinal logistic regression analysis for variables predicting students' learning from text (n = 160).

Variable	*B* (*SE*)	z	*p*	OR	95% CI
Step 1					
Mood induction group	1.57 (.32)	4.961	<.001	4.81	2.61–9.07
Step 2					
Mood induction group	1.57 (.32)	4.937	<.001	4.82	2.61–9.13
Externalizing behaviors	−.13 (.05)	−2.658	.008	.88	.80–.97
Step 3					
Mood induction group	−.22 (.71)	−.314	.754	.80	.20–3.23
Externalizing behaviors	−.27 (.07)	−3.803	<.001	.77	.67–.88
Mood induction group × externalizing behaviors	.27 (.10)	2.782	.005	1.30[a]	1.08–1.58

Note. Mood induction group coded 0 = negative mood and 1 = neutral mood.
[a] The value represents the ratio of odds ratios.

Follow-up simple slope analysis indicated that high levels of externalizing behaviors were related to poorer learning from text among students in the negative mood group (B = −.27, *SE* = .07, $z = -3.80$, $p < .001$), while no significant association was found between externalizing problems and learning from text among students in the neutral mood group (B = −.00005, *SE* = .063, $z = -.0007$, $p = 1$).

5. Discussion

To our knowledge, this is the first study addressing the moderating role of negative mood in the relationship between externalizing behaviors and primary school students' learning from an informational text. Consistent with our first hypothesis, students in a negative emotional state learned from the informational text more poorly than students in a neutral mood. This finding is in line with the view that negative mood is related to a reduction in cognitive functioning (e.g., Mitchell & Phillips, 2007) and, more specifically, to a worse way of processing and comprehending a text (Scrimin & Mason, 2015), as well to less transfer effects and learning (e.g., Brand et al., 2007). The present data also broaden the existing literature on the link between negative mood and learning by focusing on a specific age period. Children in the last year of primary school are starting to experience an increase in normal mood variation due to the approaching of puberty; hence, knowing that negative mood at this age is capable of impairing their comprehension of an informational text is particularly relevant in educational settings.

Our second hypothesis was also confirmed. Students' externalizing behaviors were negatively associated with learning from text. This finding provides further evidence on the link between externalizing behaviors, such as conduct problems and hyperactivity, and impaired learning (Zimmermann et al., 2013; Gray et al., 2014). Previous work has mainly focused on clinically significant externalizing problems, whereas in our sample externalizing behaviors were in a normal range. Hence, it is particularly interesting to note that such behaviors may put even competent children at risk for learning less from a written text.

Our main question, however, was related to the potential moderating effect of normal mood variation on the association between school-age children's externalizing behavior and learning from text. The results of the present study indicate that negative mood indeed works as a moderator, that is, students with more externalizing problems learn less from a scientific text, but only if they are in a negative mood. Externalizing behaviors, when within a normal range, might not cause any harm on students' ability to learn from a written informational text at this age. However, if readers who tend to be more hyperactive and to have more behavioral problems are in a negative mood, their ability to comprehend a text can significantly decrease. This is an important finding especially for educational practice, where teachers frequently encounter children with non-clinically significant externalizing behaviors, who fail when asked to read and comprehend a text, even if they are potentially able to do it.

The study has some limitations that should be considered when interpreting the findings. The first is the lack of a direct measure of students' response to the video-clip. It would have increased the value of the study having assessed the effectiveness of the mood-induction procedure by registering students' physiological response, instead of relying only on self-report measures. Future studies should include measures of autonomic activity before and after the mood-induction procedure. Another limitation is the use of only an explanation to assess what students learn from a text. A wider instrument should be considered for a more adequate measure of learning from text, yet the mood

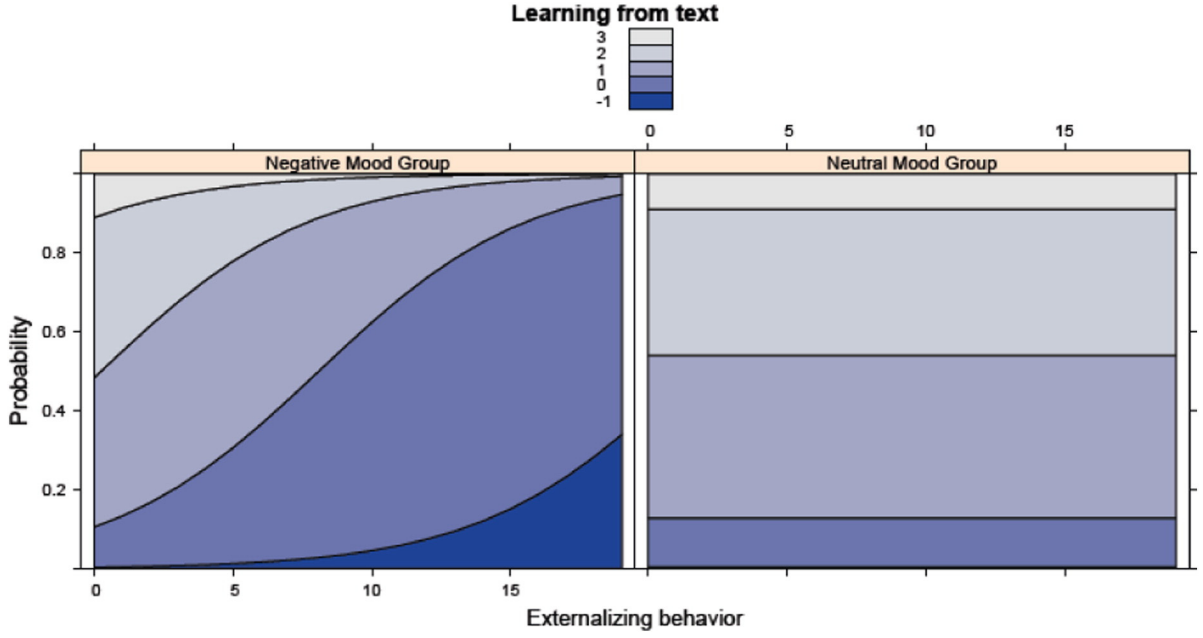

Fig. 1. Effect display for the externalizing behaviors × mood group interaction. Values on the y-axis represent the estimated continuous probability of obtaining a learning from text-score as a function of the externalizing behavior score (Fox, Hong, 2009) (n = 160).

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induction procedure imposed to choose a relatively short task, especially with participants of this age (Brenner, 2000). A third limitation of this study is that variables other than those considered may be relevant when studying the impact of mood on students' learning from text. For example, readers' interest in the topic and self-efficacy may be examined in further research.

Despite these caveats, our findings add to the existing literature by documenting the detrimental effect of a negative mood state on the link between externalizing behaviors and learning from a text in fifth graders. For a long time, research on text comprehension and learning from text focused only on cognitive factors that may support this essential component of academic achievement. Only recently an increasing interest in affective components has broadened the research focus in this field, and the role of emotional states in reading informational texts has been explored (Broughton et al., 2013). The present study extends current research on learning from text by providing evidence for the moderating role of negative mood. This unpleasant affective state exacerbates the negative effects of hyperactivity and conduct problems on the most common activity in the school context, that is, reading a text to acquire knowledge from it.

Moreover, from an applied perspective, the results give a hint to teachers and students on how negative mood may be a potential risk factor for a decreased ability to learn from a text in students with elevated hyperactivity and conduct problems. Normal mood variations are a common experience in students' everyday life, however such affective changes are usually not taken into account by teachers. Within educational settings, a great importance is given to students' manifestations of hyperactive behaviors or conduct problems as they may deteriorate learning processes. Yet, teachers may consider to lighten students' mood, for example through a short relaxing procedure before an important activity or task (Scrimin et al., 2014); in this way the negative effects of children's externalizing behaviors on learning might be less dramatic.

References

Bohn-Gettler, C., & Rapp, D.N. (2011). Depending on my mood: Mood-driven influences on text comprehension. *Journal of Educational Psychology*, *103*(3), 562–577.

Boyce, W., Torsheim, T., Currie, C., & Zambon, A. (2006). The family affluence scale as a measure of national wealth: Validation of an adolescent self-report measure. *Social Indicators Research*, *78*(3), 473–487.

Brand, S., Reimer, T., & Opwis, K. (2007). How do we learn in a negative mood? Effects of a negative mood on transfer and learning. *Learning and Instruction*, *17*(1), 1–16.

Brenner, E. (2000). Mood induction in children: Methodological issues and clinical implications. *Review of General Psychology*, *4*(3), 264–283.

Breslau, N., Breslau, J., Miller, E., & Raykov, T. (2011). Behavior problems at ages 6 and 11 and high school academic achievement: Longitudinal latent variable modeling. *Psychiatry Research*, *185*(3), 433–437.

Broughton, S.H., Sinatra, G.M., & Nussbaum, E.M. (2013). "Pluto has been a planet my whole life!" Emotions, attitudes, and conceptual change in elementary students' learning about Pluto's reclassification. *Research in Science Education*, *43*(2), 529–550.

Cain, K., & Bignell, S. (2014). Reading and listening comprehension and their relation to inattention and hyperactivity. *British Journal of Educational Psychology*, *84*(1), 108–124.

Cornoldi, C., Pra Baldi, A., & Friso, G. (2010). Prove avanzate MT di lettura. *Firenze*. Italy: OS.

Daneman, M., & Carpenter, P.A. (1980). Individual differences in working memory and comprehension. *Journal of Verbal Learning and Verbal Behaviour*, *19*, 450–466.

Ellis, H.C., & Ashbrook, P.W. (1988). Resource allocation model of the effects of depressed mood states on memory. In K. Fiedler, & J. Forgas (Eds.), *Affect, cognition, and social behavior: New evidence and integrative attempts* (pp. 25–43). Toronto: Hogrefe.

Finn, J.D., Fish, R.M., & Scott, L.A. (2008). Educational sequelae of high school misbehavior. *The Journal of Educational Research*, *101*(5), 259–274.

Fox, J., & Hong, J. (2009). Effect displays in R for multinomial and proportional-odds logit models: Extensions to the effects package. *Journal of Statistical Software*, *32*(1), 1–24.

Goodman, A., Lamping, D.L., & Ploubidis, G.B. (2010). When to use broader internalising and externalising subscales instead of the hypothesised five subscales on the Strengths and Difficulties Questionnaire (SDQ): Data from British parents, teachers and children. *Journal of Abnormal Child Psychology*, *38*(8), 1179–1191.

Goodman, R. (1997). The Strengths and Difficulties Questionnaire: A research note. *Journal of Child Psychology and Psychiatry*, *38*(5), 581–586.

Gray, S.A., Carter, A.S., Briggs-Gowan, M.J., Jones, S.M., & Wagmiller, R.L. (2014). Growth trajectories of early aggression, overactivity, and inattention: Relations to second-grade reading. *Developmental Psychology*, *50*(9), 2255–2263.

Laurent, J., Catanzaro, S., Joiner, T., Rudolf, K., Potter, K., & Lambert, S. (1999). A measure of positive and negative affect for children: Scale development and preliminary validation. *Psychological Assessment*, *1*, 326–338.

Mitchell, R.L.C., & Phillips, L.H. (2007). The psychological, neurochemical and functional neuroanatomical mediators of the effects of positive and negative mood on executive functions. *Neuropsychologia*, *45*, 617–629.

Pazzaglia, F., Palladino, P., & De Beni, R. (2000). Presentazione di uno strumento per la valutazione della memoria di lavoro verbale e sua relazione con i disturbi della comprensione [An instrument to evaluate verbal working memory and its relationship with comprehension difficulties]. *Psicologia Clinica dello Sviluppo*, *3*, 465–486.

Pekrun, R., & Linnenbrink-Garcia, L. (Eds.). (2014). *Emotions in education*. New York: Routledge.

R Core Team (2013). *R: A language and environment for statistical computing*. Vienna, Austria: R Foundation for Statistical Computing (URL http://www.R-project.org/).

Sarver, D.E., Rapport, M.D., Kofler, M.J., Scanlan, S.W., Raiker, J.S., Altro, T.A., & Bolden, J. (2012). Attention problems, phonological short-term memory, and visuospatial short-term memory: Differential effects on near- and long-term scholastic achievement. *Learning and Individual Differences*, *22*(1), 8–19.

Scrimin, S., Mason, L., & Moscardino, U. (2014). School-related stress and cognitive performance: A mood-induction study. *Contemporary Educational Psychology*, *39*, 355–368.

Scrimin, S., & Mason, L. (2015). Does mood influence text processing and comprehension? Evidence from an eye movement study. *British Journal of Educational Psychology*, *85*(3), 387–406.

van Batenburg-Eddes, T., & Jolles, J. (2013). How does emotional wellbeing relate to underachievement in a general population sample of young adolescents: A neurocognitive perspective. *Frontiers in Psychology*, *4*, 1–10.

Venables, W.N., & Ripley, B.D. (2002). *Modern applied statistics with S* (4th ed.). New York: Springer.

Yang, H., & Yang, S. (2014). Positive affect facilitates task switching in the dimensional change card sort task: Implications for the shifting aspect of executive function. *Cognition and Emotion*, *28*(7), 1242–1254.

Zimmermann, F., Schütte, K., Taskinen, P., & Köller, O. (2013). Reciprocal effects between adolescent externalizing problems and measures of achievement. *Journal of Educational Psychology*, *105*(3), 747.

Please cite this article as: Scrimin, S., et al., Externalizing behaviors and learning from text in primary school students: The moderating role of mood, *Learning and Individual Differences* (2015), http://dx.doi.org/10.1016/j.lindif.2015.08.023