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FAST-TRACK REPORT

A hidden cost of happiness in children

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Abstract

*Happiness is generally considered an emotion with only beneficial effects, particularly in childhood. However, there are some situations where the style of information processing triggered by happiness could be a liability. In particular, happiness seems to motivate a top-down processing style, which could impair performance when attention to detail is required. Indeed, in Experiment 1, 10- to 11-year-old children (*N *= 30) induced to feel a happy mood were slower to locate a simple shape embedded in a complex figure than those induced to feel a sad mood. In Experiment 2, 6- to 7-year-old children (*N *= 61) induced to feel a happy mood found fewer embedded shapes than those induced to feel a sad or neutral mood. Happiness may have unintended and possibly undesirable cognitive consequences, even in childhood.*

Introduction

Adults generally do their best to maximize children's positive emotions. This is especially apparent in educational settings, where Loveless (2006) noted that 'many of the most popular education reforms of today . . . place children's happiness on equal footing with their learning' (p. 13). This 'happiness factor', as Loveless called it, is intuitively appealing. Conventional wisdom holds that happy children make the best learners.

And yet, happiness is not always associated with optimal outcomes. Rose, Futterweit and Jankowski (1999) found that 5-, 7-, and 9-month-olds who displayed positive emotion were slower to distinguish a familiar face from novel ones than infants who displayed neutral affect. Similarly, Bloom and Capatides (1987) found that the more spontaneous positive emotion infants displayed during play sessions, the later they were to acquire their first words. Although these studies are correlational, they suggest that there are circumstances in which happiness may actually be a disadvantage.

Research on the effect of emotion on information processing in adults provides a clue as to why this might be. A number of researchers have suggested that particular moods trigger unique styles of information processing (e.g. Bodenhausen, Kramer & Süsser, 1994; Isen & Daubman, 1984; Fiedler, 2001; Storbeck & Clore, 2005). For example, Gasper and Clore (2002) presented adult participants with a task in which they had to decide whether a target was more similar to a shape that shared the local features of the target, or one that shared its global features. For example, the target might be a large triangle made out of smaller triangles, and the two choices would be a large square made out of triangles (local match) and a large triangle made out of squares (global match). Gasper and Clore found that adults induced into a happy mood tended to select the global match, whereas those induced into a sad mood tended to select the local one. They argued that happiness motivated a top-down style of information processing, and sadness, a bottom-up style.

Importantly, neither style of information processing is universally better. When creativity and flexibility are required, experimental work with both adults and children has shown that happy individuals outperform sad ones (Greene & Noice, 1988; Isen, 1987; Rader & Hughes, 2005). For example, 6- and 7-year-olds who listened to a happy story later engaged in more flexible thinking than those who listened to a sad or neutral one (Rader & Hughes, 2005; see also Schellenberg, Nakata, Hunter & Tamoto, 2007). Similarly, eighth-graders induced to feel happy were more likely to generate a correct solution to Duncker's (1945) candle problem than children in a neutral mood (Greene & Noice, 1988).

But when attention to detail is required, research with adults has shown that happy individuals may be at a disadvantage. In Storbeck and Clore (2005), for example, adult participants read a list of words, all of which were related to a theme (e.g. Deese, 1959; Roediger & McDermott, 1995). For example, a list might contain words related to sleep, but importantly, the word 'sleep' never actually appears on the list. Later, those who had been induced to feel happy were more likely than those induced to feel sad to falsely indicate that 'sleep' appeared on the list. Storbeck and Clore argued that the happy participants were more likely to form a gist-like representation of the

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words on the list, which made them more susceptible to experiencing a false memory. Thus, although feeling good is pleasant, it does not guarantee optimal performance in every situation.

As noted earlier, there is already experimental research showing a benefit of happiness in children (and adults) when a situation requires flexible or creative thinking (Greene & Noice, 1988; Isen, 1987; Rader & Hughes, 2005; Schellenberg *et al.*, 2007). But there has not yet been experimental research investigating whether there is also a cost of happiness in children, as there is in adults, when a situation requires attention to detail. In the two studies reported here, we asked whether inducing happiness would impair children's ability to locate simple shapes embedded in complex figures. Experiment 1 focused on 10- to 11-year-old children, and Experiment 2 on 6- to 7-year-olds.

Experiment 1

Because music is a powerful tool to induce emotional states (Trainor & Schmidt, 2003), and many mood studies involving adults have used music to induce a particular mood (e.g. Bodenhausen *et al.*, 1994), we also used a music induction in our first experiment. Happiness or sadness was induced by playing a piece by Mozart or one by Mahler. As the music played, children completed items from the Children's Embedded Figures Test (CEFT; Witkin, Oltman, Raskin & Karp, 1971). The embedded figures test was originally designed to measure individual differences in field dependence (Witkin, Lewis, Hertzman, Machover, Meissner & Wapner, 1954), but it has since been used to assess global and local levels of processing in children (e.g. Jarrold, Gilchrist & Bender, 2005). We measured how long it took children to locate each of the embedded figures. Our predictions were straightforward: Happiness leads adults to engage in top-down processing and sadness leads them to engage in bottom-up processing (e.g. Gasper & Clore, 2002; Storbeck & Clore, 2005). If mood has the same effect on information processing in children, those induced to feel happy should be slower to locate the embedded figures than those induced to feel sad.

Method

Participants

Thirty 10- to 11-year-old children (M = 11 years, 0 months; range = 10;7 to 11;5; 15 females) participated. Children were recruited from and tested at a local primary school.

Materials

Embedded figures. Twenty black-and-white items from the Children's Embedded Figures Test were used. Figure 1 shows an example item.

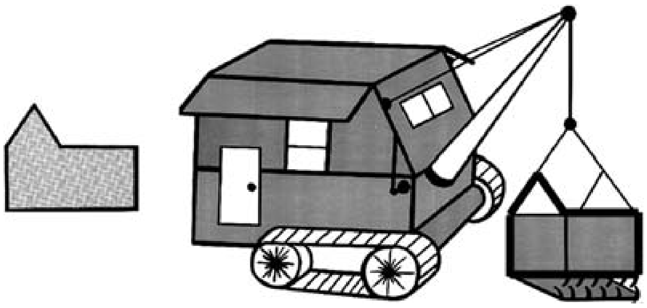

Figure 1 *Example test item (adapted from the CEFT; Witkin* et al.*, 1971). Children searched for the house-like shape (in bold for illustrative purposes only).*

Mood induction. Children listened to 12.5-minute looped segments of either Mozart's *Eine Kleine Nacht Musik* (n = 15) or Mahler's *Adagietto* (n = 15). In research with adults, these two pieces have been shown to induce happy and sad moods, respectively (Niedenthal & Setterlund, 1994; Storbeck & Clore, 2005).

Manipulation check. Affective reactions to the music were measured using a continuum of five schematic faces, ranging from one depicting a pronounced frown to one depicting a strong smile (Rader & Hughes, 2005). Children were invited to point to the face representing how they felt, and responses were coded on a scale from 1 (= very sad) to 5 (= very happy).

Procedure

Participants were tested individually in a private room as the experimental music played at an audible, but non-disruptive volume – as if a radio were playing in the background. The experimenter did not draw children's attention to the music. The experimenter administered the CEFT following the instructions specified in the test manual. She began by giving six practice trials, which increased in difficulty from simply identifying which of four triangles was identical in size and shape to a target triangle to locating a triangle in a more complex figure. After practice trials were successfully completed, the experimenter administered six test trials, which also involved locating a triangle. Next, she administered an additional five practice and 14 test trials, each of which involved locating a house-like shape embedded in a more complex figure (see Figure 1). On each trial, children were given a cut-out of the target shape, which they could use as a template to facilitate their search. We recorded the amount of time between when a complex figure was presented and when the embedded shape was located.

As a manipulation check, after completing the 20 test trials, the experimenter drew the participants' attention to the fact that music was playing in the background. She allowed them to listen briefly, and then asked them to point to one of the five schematic faces that best illustrated how the background music made them feel. Finally, all participants listened to the happy music as

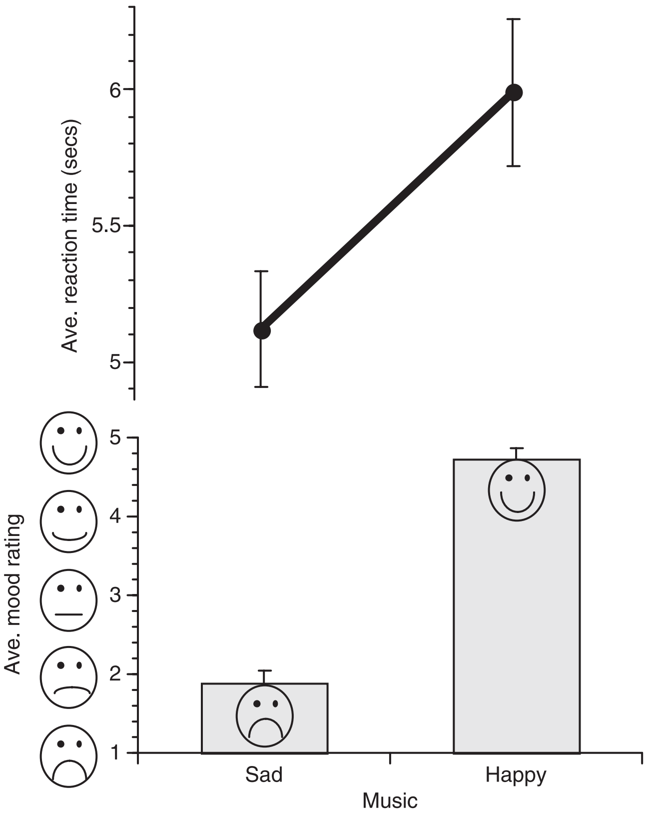

Figure 2 *Means of self-reported mood and average time to locate embedded figures in Experiment 1. Error bars show SEM.*

they were being debriefed to undo potential lingering negative feelings produced by the sad music.

Results and discussion

Manipulation check

As shown in Figure 2 and consistent with research with adults that has used the same type of music (Niedenthal & Setterlund, 1994; Storbeck & Clore, 2005), children listening to Mozart reported that it made them feel significantly happier than children listening to Mahler. This was confirmed by a one-way ANOVA, $F(1, 28) = 199.12$, $p = .001$, $\eta_p^2 = .88$. Thus, we found that for this younger sample, music was an effective method to induce a happy or sad mood.

Reaction times

As recommended by Tabachnick and Fidell (2001), box plots were inspected for outliers. Fifteen extreme reaction times (outside of three box lengths of the interquartile range; 2.5% of all data points) were eliminated and replaced with the variable means. As Figure 2 shows, children listening to happy music were slower to locate the embedded shapes than children listening to sad music. A one-way ANOVA on these data confirmed a significant effect of condition, $F(1, 28) = 6.07$, $p = .02$, $\eta_p^2 = .18$.

Like adults (e.g. Storbeck & Clore, 2005), 10- to 11-year-olds performed worse on a detail-oriented task when they were induced into a happy mood compared to when they were induced into a sad mood. From these results, however, we cannot know whether happiness impaired children's performance or whether sadness enhanced it. Experiment 2 was designed to address this question by comparing happy and sad moods with a neutral mood, and to extend our investigation to 6- to 7-year-olds. Extending our investigation to this younger age group was of considerable interest because, as noted earlier, previous research has shown that 6- and 7-year-olds seem to benefit from being induced into a happy mood when a task requires flexible thinking (Rader & Hughes, 2005). In Experiment 2, we asked whether happiness might actually impair 6- and 7-year-old children's performance when a task required attention to detail.

Experiment 2

The use of a younger age group motivated two procedural changes from Experiment 1. First, because adult-like emotional responses to music have been clearly documented only for children 7 years of age and older (Gerardi & Gerken, 1995; Gregory, Worrall & Sarge, 1996), we induced moods using animated film clips rather than music. Second, instead of using reaction time as the dependent measure, we followed Witkin *et al.*'s (1971) recommendations for use of the CEFT with very young children and used the number of embedded figures located.

Method

Participants

Sixty-one 6- to 7-year-olds (M = 6 years, 9 months; range = 6;3 to 7;3; 31 females) participated. They were recruited from and tested in their primary school. One additional participant's data were excluded because his self-reported mood rating was three box-lengths lower than the mean of the condition in which he participated (Tabachnick & Fidell, 2001).

Materials

Three-minute clips from animated films were used to induce positive, negative, or neutral affect. Children watched either a happy scene from *The Jungle Book*, where Baloo sings '*The Bare Necessities*' (n = 19); a neutral scene from *The Last Unicorn*, where a knight arrives at a castle (n = 21); or a sad scene from *The Lion King*, where Simba mourns the death of his father (n = 21). These particular happy and sad clips have been shown to be effective in eliciting happy and sad moods, respectively, in a large sample of 6- to 12-year-olds (von Leupoldt, Rohde, Beregova, Thordsen-Sorensen, Zur Nieden & Dahme, 2007).

The same embedded figure items as in Experiment 1 were used. Five additional items from the CEFT appropriate only for younger samples (Witkin *et al.*, 1971) were added to the triangle set, resulting in a total of 25 test trials.

Procedure

Participants were tested individually. They watched one of the three clips, and then used the schematic faces to indicate how the film clip made them feel. The experimenter led children through the triangle and house practice and test trials, as described in Experiment 1, and recorded the number of embedded shapes located. Children were allowed to search on each trial until they located the shape or until they indicated that they could not find it. Following the test, children who had watched the sad clip were shown the happy one.

Results and discussion

Manipulation check

As Figure 3 shows, the film clips were highly effective at inducing specific happy, sad, and neutral moods. A one-way ANOVA on these mood ratings yielded a significant effect of condition, $F(2, 58) = 34.63$, $p = .001$, $\eta_p^2 = .54$. Planned comparisons showed that children who watched

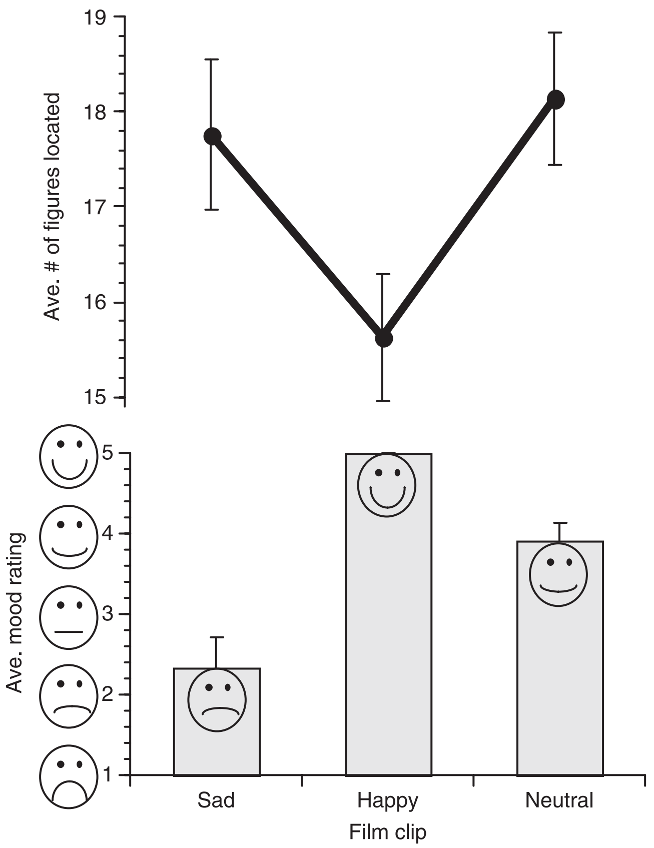

Figure 3 *Means of self-reported mood ratings and average number of embedded figures located in Experiment 2. Error bars show SEM.*

the happy clip rated themselves as happier than those who watched the neutral or sad clips, $ts(58) > 3.39$, $ps < .001$, $ds > .89$, and those who watched the neutral clip rated themselves as happier than those who watched the sad one, $t(58) = 4.99$, $p = .001$, $d = 1.31$.

Correct responses

As Figure 3 also shows, the number of embedded figures children located was influenced by the mood into which they had been induced, $F(2, 58) = 3.14$, $p = .04$, $\eta_p^2 = .11$. Those induced into a happy mood found fewer figures than those induced into neutral, $t(58) = 2.44$, $p = .02$, $d = .64$, or sad moods, $t(58) = 2.07$, $p = .04$, $d = .54$. However, those induced into a neutral mood found the same number of figures as those induced into a sad mood, $t(58) = .38$, $p = .71$. This last finding, showing no difference between the sad and neutral conditions, is crucial: It demonstrates that, compared to a neutral mood, sadness did not improve performance; rather, happiness worsened it.

General discussion

Inducing happiness impaired children's performance when attention to detail was required. In Experiment 1, 10- to 11-year-olds induced into a happy mood were slower to locate embedded figures than those induced into a sad mood. In Experiment 2, 6- to 7-year-olds induced into a happy mood found fewer embedded figures than those induced into a neutral or sad mood. Previous research has shown that inducing a positive mood in children can have beneficial effects when creativity or flexibility is required (Rader & Hughes, 2005; Greene & Noice, 1988; Schellenberg *et al.*, 2007). However, to our knowledge, the two studies reported here are the first to demonstrate that experimentally inducing a positive mood in children can have negative effects when attention to detail is required.

Our results are consistent with those from studies in the adult literature, which have shown that although happy adults outperform sad adults when creativity is required (Isen, 1987), sad adults outperform happy ones when attention to detail is required (Gasper & Clore, 2002; Storbeck & Clore, 2005). The mechanism responsible for this effect in adults has been the subject of some debate (see Ashby, Isen & Turken, 1999; Clore & Schnall, 2005; Forgas, 2002; Schwarz & Clore, 2007, for reviews), and the present studies were not specifically designed to differentiate between different theoretical accounts. One possibility is that people use the information derived from their affect directly to infer whether more elaborate processing should be carried out (Clore, Wyer, Dienes, Gasper, Gohm & Isbell, 2001). On this view, happiness indicates that things are going well, which leads to a global, top-down style of information processing. Sadness indicates that something is amiss, triggering detail-oriented, analytical processing.

Another possibility is that happy people avoid engaging in detail-oriented processing because doing so could disrupt their positive mood (Isen, 1987; Wegener, Petty & Smith, 1995). Finally, intense positive feelings can cause widespread activation of thoughts unrelated to the task at hand. This activation may limit the cognitive resources available to engage in detail-oriented processing (Mackie & Worth, 1989). Further research will be required to determine the extent to which these models can explain the role of affect on children's performance.

One alternative explanation for our findings could be that children's performance in the different conditions was driven not by the affect they were experiencing as a result of a particular mood induction, but by the materials used in the mood induction itself. For example, perhaps children listening to Mozart in Experiment 1 enjoyed that music more than those listening to Mahler, and so devoted more attention to it, thereby reducing the amount of attention available to locate the embedded figures. Although we cannot rule out this explanation, we find it unlikely for several reasons.

First, during the study, children's attention was never drawn to the music; it simply played in the background. Second, in the literature on emotion and cognition–emotion links, using music as a means of inducing mood is a common and well-accepted practice (e.g. Bodenhausen *et al.*, 1994; Trainor & Schmidt, 2003), and studies with adults have used the same pieces used here (Niedenthal & Setterlund, 1994; Storbeck & Clore, 2005). Third, Experiment 2 offers converging evidence using film clips (which ended before the embedded figures task began) rather than music as a mood induction. In the emotion literature, there is also a rich history of using film clips as a means to induce mood (e.g. Rottenberg, Ray & Gross, 2007; Gross & Levenson, 1995), and we used happy and sad clips that have been standardized with children (von Leupoldt *et al.*, 2007). Finally, the correlational studies described earlier, in which infants displaying positive emotion were slower to learn a discrimination task (Rose *et al.*, 1999) or to acquire their first words (Bloom & Capatides, 1987), lend support to our preferred interpretation, which is that affect itself can influence information processing.

Interestingly, positive affect may also have a hidden cost in some disease contexts, because it can prevent individuals from perceiving the severity of their symptoms. For example, von Leupoldt, Riedel and Dahme (2006) had 6- to 12-year-olds with mild asthma breathe through an apparatus that made it mildly difficult to breathe. Children reported feeling less shortness of breath after watching a positive film clip than after watching a neutral or negative one, even though their actual lung function was the same across all three conditions. On the surface, reducing the feeling of breathlessness in children (or adults) with asthma may seem like a positive outcome. However, as von Leupoldt *et al.* point out, it can be dangerous if patients fail to recognize the severity of their symptoms and delay treatment as a result (see also Rietveld, Everaerd & van Beest, 2000).

It is important to emphasize that there are certainly contexts in which a positive mood has been shown to be beneficial for a child – when a task calls for creative thinking, for example (Greene & Noice, 1988; Rader & Hughes, 2005; Schellenberg *et al.*, 2007). But when attention to detail is required, it may do more harm than good. In summary, artificially inflating a child's mood may have unintended and possibly undesirable cognitive consequences.

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