Making the worst of a good job: Induced dampening appraisals blunt happiness and increase sadness in adolescents during pleasant memory recall.

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Abstract

Previous work has shown that dampening appraisals (e.g., thinking "this is too good to last") reduce happiness and enhance sadness when adults recall positive events. In contrast, amplifying appraisals (e.g., thinking "this is the sign of good things to come") do not significantly alter affective experience during the same task. The present study examined whether this pattern holds in adolescence. Eighty-nine adolescents completed an uninstructed positive recall task before being randomized to either dampening, uninstructed control or amplifying instructions during a second positive recall task. Participants experienced a significantly smaller increase in happiness and a significantly less marked reduction in sadness when recalling a positive memory under dampening instructions, relative to both the amplifying and no instruction control conditions. There was no significant difference between the amplifying and control conditions. This broadly replicates adult findings, but the detrimental effects of dampening were less marked in adolescents than adults. Nevertheless, given that elevated dampening appraisals are associated with depressed mood, dampening may partly account for why depressed adolescents struggle to experience positive emotions, and represent a promising target for clinical intervention.

Keywords: Positive affect, appraisal style, anhedonia, depression, adolescence.

Introduction

Depression is a prevalent, chronic, recurrent and disabling disorder in adolescence (Thapar, Collishaw, Pine & Thapar, 2012). The core symptoms required to make a diagnosis of major depressive disorder are the presence of depressed mood and loss of interest or pleasure (anhedonia). These reflect underlying disturbances in two partly dissociable systems regulating withdrawal from punishing stimuli (the negative valence system; NVS) and approach to rewarding stimuli (the positive valence system; PVS). The PVS primarily shapes positive affect (PA) experience, while the NVS primarily determines negative affect (NA) experience (Carver & White, 1994; Insel et al., 2010; Paulus et al., 2017; Watson, Clark, & Tellegen, 1988). To date, adolescent depression research has focused on trying to understand and repair elevation in the NVS, while the PVS has been relatively neglected (Forbes & Dahl, 2012; Gilbert, 2012).

Anhedonia typically first emerges in early adolescence (Sørensen, Nissen, Mors, & Thomsen, 2005), is highly prevalent in clinically depressed adolescents (Bennett, Ambrosini, Kudes, Metz, & Rabinovich, 2005), and predicts treatment non-response (McMakin et al., 2012) and suicidality (Auerbach, Millner, Stewart, & Esposito, 2015). A central component of anhedonia is reduced 'liking' (less marked increase in PA in response to rewarding stimuli) when anticipating a future positive event, when consummating a reward in the moment, and when recalling a past positive event (Dunn et al., 2018).

There is a need to better understand and develop more effective ways to target anhedonia in adolescence. One way forward is to examine which underlying psychological mechanisms are involved in positive emotion regulation and how this might go awry in depression (an experimental psychopathology approach; Holmes et al., 2018). A burgeoning literature is delineating positive emotion regulation in adults (Carl, Soskin, Kerns, & Barlow,

2013; Dunn, 2017; Quoidbach, Mikolajczak, & Gross, 2015) but this is less well understood in adolescence.

One candidate mechanism driving anhedonia in depression is the way individuals appraise positive emotion experience (Feldman, Joormann, & Johnson, 2008). 'Dampening' appraisals (e.g., think "this is too good to last") may inhibit, whereas 'amplifying' appraisals (e.g., think "I am getting everything done") may enhance, PA. In adults, elevated dampening and reduced amplifying are associated with increasing anhedonia severity cross-sectionally (Nelis et al., 2015; Werner-Seidler, Banks, Dunn, & Moulds, 2013) and, to some extent, prospectively (Nelis et al., 2015). Experimentally manipulating reduces PA when anticipating and recalling positive events (Dunn et al., 2018) and when engaging in everyday positive activities (Burr, Javaid, Jell, Werner-Seidler, & Dunn, 2017). Instructed amplifying does not alter affective experience, however (Burr et al., 2017; Dunn et al., 2018).

Appraisal style may also be an important positive emotion regulation mechanism in adolescence. However, we cannot simply assume that dampening and amplifying appraisals will have identical effects in adolescents as adults. There is rapid emotional and cognitive development during adolescence, with a strengthening of 'top-down' cognitive control (Blakemore, 2015; Crone & Steinbeis, 2017; Paus, 2005; Skinner & Zimmer-Gembeck, 2016). It is plausible that before this cognitive control has been fully developed, reappraisal style may have a diminished influence on PA. This issue requires empirical evaluation.

We are aware of only three studies examining the link between positive appraisal style and anhedonia levels in younger populations. As in adult populations, greater dampening and reduced amplifying are associated with increasing anhedonia cross-sectionally (Bastin, Nelis, Raes, Vasey, & Bijttebier, 2018; Gilbert, Luking, Pagliaccio, Luby, & Barch, 2017; Nelis, Bastin, Raes, & Bijttebier, 2018), and to a less clear extent prospectively (Nelis et al., 2018). Association studies of this kind cannot causally test

whether appraisal alters affective experience and what is required are experimental studies that manipulate appraisals. As a preliminary investigation of this issue, in the present study we examine if manipulating positive appraisal style alters affective experience when adolescents recall positive memories (replicating and extending the method used in Dunn et al., 2018). All participants recalled a first memory under no particular instructions and then were randomised to recall a second memory when following dampening, amplifying or control instructions (a mixed within-between subjects design).

Based on findings reported in Dunn et al. (2018), we predicted that greater spontaneous use of dampening (Hypothesis One) and reduced spontaneous use of amplifying (Hypothesis Two) would be linked to a greater decrease in happiness and a greater increase in sadness during the first uninstructed memory recall. Further, we expected that instructed dampening would lead to reduced happiness reactivity and increased sadness reactivity during the second memory recall (Hypothesis Three), such that happiness would decrease, and sadness would increase from before to after the memory recall. We made no *a priori* predictions regarding the impact of the amplifying conditions given previous null findings (cf. Dunn et al., 2018). Exploratory post-hoc analyses examined the correlations between anhedonia symptoms and trait and state use of each appraisal style. Further we also explored whether anhedonia severity modified the effects of the experimental manipulations.

Methods

Participants

92 students were recruited from four secondary schools and sixth-form colleges in the South-West area of England, two of whom were excluded due to suicidal risk. The remaining 90 students were allocated to the experimental conditions (dampening n=31; amplifying n=30; control n=29) based on a predetermined randomisation list. One participant's data (in the amplifying condition) were lost due to experimenter error, leaving a final sample size of

89. Participants were aged from 13 to 18 years (M_{age} = 15.85, *SD*=1.37; 83/90 aged < 18[1]), predominantly female (71.9%), White Caucasian (93.3%), and from families where both parents were currently employed (70.1%) and had completed secondary level education (53.4% of mothers and 50.5% of fathers). Participants and their parents gave written, informed consent prior to taking part, the study was approved by the local university ethics committee, and participants were given a £10 high street voucher for taking part.

Questionnaire Measures

The 14-item Snaith-Hamilton Pleasure Scale (SHAPS; Leventhal et al., 2015; Snaith et al., 1995) indexed anhedonia, using the continuous scoring method developed by Franken, Rassin, and Muris (2007). The 17-item Responses to Positive Affect Scale for Children (RPA-C; Verstraeten, Vasey, Raes, & Bijttebier, 2012) was used to measure trait dampening and amplifying appraisals in response to PA. A modified version of the RPA-C was used to measure state appraisal during memory recall (asking participants "When just recalling that memory, to what extent did you think or feel the following way?"). We used the factor structure of the state RPA reported in Dunn et al. (2018). Reliabilities of all subscales of all measures were adequate in the present sample (Chronbach's α all >.70).

Experimental Task

The experimental task was as described by Dunn et al. (2018), but adapted for adolescents. In brief, a computerised task asked participants to recall two positive memories, the first when following control instructions and the second when being randomised to follow amplifying, dampening, or control instructions. Participants wrote down whatever was going through their mind during each recall (written stream of consciousness). Participants rated the extent to which they experienced happiness and sadness in a 30s rest task immediately prior to each memory recall and during each two-minute recall itself, using 100 point sliding visual analogue scales ranging from 1 (not at all) to 100 (extremely). They also completed the state

modified RPA-C to indicate how much they made use of amplifying and dampening appraisals during each recall. To minimise contamination between the first and second recall, participants completed a 3m washout task between each recall (viewing abstract moving shapes). To repair mood at the end of the experiment, participants watched a 2m amusing video from the movie *Bruce Almight*y. An independent rater (blinded to condition), inspected cue words and written narratives to confirm that all memories recalled were positive in nature (see supplementary materials for a full description of the questionnaire measures and task).

Procedure

Testing took place in a quiet room, on average lasting around 25m. Participants read the information sheet and gave written informed consent. Demographic information was taken and participants completed the questionnaire measures. If required a suicidal risk assessment was completed to determine eligibility to take part. Participants then practised the mood rating and stream of consciousness instructions and finally completed the experimental task.

Results

Alpha was set at 0.05 and statistical tests were two-tailed. As data met all the required assumptions for parametric analyses, no additional steps were taken to correct the data prior to analysis.

Participant characteristics

Analyses (one-way ANOVA for continuous variables and chi-square for categorical variables) found no significant group differences on any clinical or demographic variables, *p*s>0.35 (Table One). The memory recall task worked as intended, with a significant increase in happiness, *mean*Δ=25.61, *SD*=18.30, paired-sample *t*=13.20, *p*<0.001, *d*=1.40, but no change in sadness *mean*Δ=-1.92, *SD*=19.34, *t<1,* from the first rest task to the first memory recall (replicating Dunn et al., 2018). To account for individual differences in baseline affect,

subsequent analyses used residual change scores (regressing resting task ratings onto memory ratings and then saving the unstandardized residuals).

Associations between spontaneous appraisal and affective experience during memory one

Greater spontaneous use of dampening during the first uninstructed memory was not significantly associated with happiness reactivity, Pearson's r=-.21, p=0.85, but was associated with a less marked decrease in sadness, r=.44, p<.001. In contrast, greater spontaneous use of amplifying during the first uninstructed memory was associated with a greater happiness increase, r=.25, p=0.02, and a greater sadness decrease, r=-.26, p=0.02.

Appraisal style manipulation check

As intended, there were no significant group differences in use of amplifying or dampening appraisals during the first memory, Fs<1 (see Table Two). To test whether appraisal style changed as a function of manipulation instructions, a simple difference score was computed to capture the change in each appraisal style in the first versus second memory. Conditions significantly differed on amplifying change scores, one-way ANOVA $F(2,86)=10.00$, $p<0.001$, $\eta_p^2=0.19$. Pairwise comparisons revealed that the dampening condition significantly differed from the control and amplifying conditions, ps<0.01, but there was no significant difference between the control and amplifying conditions, p=0.45. There was a significant increase in amplifying scores in the amplifying, *mean*Δ=2.21, SD=4.45, one sample t=2.67, p=0.01, d=0.50, and control, *mean*Δ=1.34, SD=2.69, t=2.69, p=0.01, d=0.50, conditions, compared to a significant decrease in the dampening condition, *mean*Δ=-2.48, SD=5.37, t=2.57, p=0.02, d=0.46.

Dampening also varied between conditions, one-way ANOVA $F(2,86)=9.82$, $p<0.001$, $\eta_p^2=0.19$, with the dampening condition significantly differing from the control and amplifying conditions, ps<0.01, while the amplifying and control conditions did not significantly differ, p=0.38. There was a non-significant increase in dampening scores in the

amplifying condition, *mean*Δ=0.03, *SD*=2.83, one sample $t<1$, a non-significant decrease in dampening in the control condition, *mean*Δ=-0.76, *SD*=3.20, one sample $t=1.28$, $p=.21$, $d=0.24$, and a significant increase in the dampening condition, *mean*Δ=2.97, *SD*=4.12, one sample $t=4.01$, $p<0.001$, $d=0.72$. In summary, the dampening, but not the amplifying, manipulation was successful.

Impact of appraisal style manipulations on affective experience

Table Two reports mean affective ratings for each condition. While all statistical analyses used residual change scores to index emotional reactivity, figures One and Two instead plot simple change in happiness and sadness ratings for ease of visual interpretation.

As intended, one-way ANOVAs found no group differences in happiness residual change, $F<1$, or sadness residual change, $F(2,86)=1.33$, $p=0.27$, $\eta_p^2=0.03$, during the first uninstructed memory. To examine the effect of the appraisal style manipulation on affective experience, we computed a simple difference score between reactivity (residual change) to the first and second memories. A significant effect of condition on happiness reactivity change emerged, one-way ANOVA $F(2,86)=15.88$, $p<0.001$, $\eta_p^2=0.27$. The dampening condition significantly differed from the control and amplifying conditions, ps<0.001, but there was no significant difference between the control and amplifying conditions, $p=0.34$. There was a significant increase in happiness reactivity from the first to the second memory in both amplifying, *mean*Δ=7.14, *SD*=18.19, $t=2.11$, $p=0.04$, $d=0.40$, and control, *mean*Δ=13.04, *SD*=11.96, $t=5.87$, $p<0.001$, $d=1.09$, conditions. In the dampening condition, happiness reactivity significantly decreased from the first to the second memory, *mean*Δ=-18.88, *SD*=33.68, $t=3.12$, $p<0.01$, $d=0.56$.

There was also a significant difference in change in sadness reactivity between conditions, one-way ANOVA $F(2,86)=13.59$, $p<0.001$, $\eta_p^2=0.24$. Again, the dampening condition significantly differed from the control and amplifying conditions, ps<.001, but the

amplifying and control conditions did not differ, p=0.83. The sadness change scores significantly increased from the first to the second memory in the dampening condition, *mean*Δ=17.48, *SD*=32.70, t=2.98, p=0.01, d=0.53, and significantly decreased from the first to the second memory in the control condition, *mean*Δ=-8.71, *SD*=13.61, t=3.45, p=0.002, d=0.64. In the amplifying condition, there was a non-significant decrease in sadness reactivity from the first to the second memory, *mean*Δ=-9.98, *SD*=17.75, t=3.03, p=0.01, d=0.56.

Next, we examined whether the dampening manipulation had turned the positive memory recall task into a negative mood induction. In contrast to findings from Dunn et al. (2018) in adults, while sadness did significantly increase from rest to the second memory recall in the dampening condition, *mean*Δ=20.03, *SD*=30.78, paired-sample t=3.62, p<0.01, d=0.65, there was only a non-significant decrease in happiness over the same time frame, *mean*Δ=-1.30, *SD*=33.04, paired-sample t<1.

the differences in absolute amplifying and dampening appraisals and in happiness and sadness residual change from the first memory to the second memory for participants in the dampening condition were computed and then correlated with one another. Greater increase in dampening was related to greater happiness reduction, r=-.68, p<0.001, and greater sadness increase, r=.71, p<0.001. Greater reduction in amplifying was associated with reduced happiness change, r=.62, p<0.001, and greater sadness change, r=-.46, p<0.01.

Exploratory anhedonia analyses

Post hoc analyses explored the association between SHAPS anhedonia symptoms and the use of each appraisal style. Greater anhedonia was associated with elevated trait dampening, r=.46, p<.001, and reduced trait amplifying, r=-.62, p<.001. Further, more anhedonic individuals made greater spontaneous use of dampening, r=.45, p<.001, and amplifying, r=-.42, p<.001, during the first uninstructed memory recall. Unsurprisingly, those

higher in trait dampening made more spontaneous state use of dampening appraisals, r=.69, p<.001, and those higher in trait amplifying made more spontaneous state use of amplifying appraisals, r=.51, p<.001. We repeated the key reactivity by condition analyses when entering (mean centred) SHAPS score as a covariate to see if intake anhedonia moderated the findings. The interaction term in both of these analyses was non-significant, Fs<1.218, ps>.301, η_p^2<.029.

Discussion

The present study examined the consequences of instructed use of dampening and amplifying appraisals when adolescents were asked to recall positive memories. Greater spontaneous use of dampening appraisals was significantly associated with less of a sadness reduction (but not a happiness increase) when recalling the first positive memory, only partly supporting Hypothesis One and differing from adult findings where spontaneous dampening was linked to happiness but not sadness reactivity (Dunn et al., 2018). Greater spontaneous use of amplifying was significantly linked to greater sadness decrease and happiness increase when recalling a positive memory, consistent with Hypothesis Two but deviating from previous adult findings (where amplifying was linked to happiness but not sadness reactivity; Dunn et al., 2018). Mirroring findings in adults (Dunn et al., 2018), the dampening manipulation successfully increased use of dampening appraisals (but also lowered use of amplifying appraisals), relative to the control condition. The amplifying manipulation did not significantly alter appraisal style, failing to replicate adult findings (Dunn et al., 2018).

Largely supporting Hypothesis Three, the dampening condition decreased happiness reactivity and increased sadness reactivity, compared to both the control and the amplifying condition (broadly replicating findings in adults; Dunn et al., 2018). However, only partly replicating the adult data (Dunn et al., 2018), in absolute terms the dampening instructions

led to a significant increase in sadness (but not a significant decrease in happiness) from pre to post the second memory recall.

Replicating the null adult findings (Dunn et al., 2018), there was no significant difference in sadness and happiness reactivity between the amplifying and control conditions. However, an important caveat is that the amplifying manipulation did not significantly alter amplifying appraisals in the present study, meaning it is inappropriate to draw strong conclusions about the impact of amplifying on the basis of the present data.

Overall, the present results broadly mirror findings in adults that dampening during positive recall reduces happiness and increases sadness. However, the consequences of dampening were less clearly toxic in adolescents and do not support the strong form of the dampening hypothesis put forward in adults (Dunn et al., 2018; Burr et al., 2017). In particular, in the present study the dampening instructions meant the positive memory recall was less effective at enhancing happiness, but the memory recall was still nevertheless a positive mood induction. In contrast, in previous adult samples instructed dampening led to an absolute reduction in happiness from pre to post recall (i.e. the memory no longer served as a positive mood induction; Dunn et al., 2018; Burr et al., 2017). These results are consistent with the perspective that appraisal-based strategies may become more potent (for better or for worse) as top-down cognitive control develops with age (cf. Blakemore, 2008; Crone & Steinbeis, 2017).

It is important to consider why the amplifying manipulation was unsuccessful. It is unlikely adolescents spontaneously made high use of amplifying appraisals in the control condition (i.e. a ceiling effect), as amplifying scores were not at maximum during the uninstructed first memory recall. The kind of amplifying appraisals captured by the scale (predominantly achievement themes) may not be relevant to the positive memories adolescents recalled. In particular, only 16/180 memories were clearly focused on

achievement themes (exam or sporting success, passing a driving test). This contrasts to more frequent recall of achievement related memories in the young adult sample in Dunn et al. (2018), potentially explaining why the amplifying manipulation was successful in that sample but not the present sample. Moreover, the phrasing of the amplifying items may capture more pathological amplifying appraisals associated with manic states (Feldman et al., 2008). Future studies in adolescents may need to either give specific instructions to recall achievement related themes or instead use a different methodology to induce amplifying appraisals.

Exploratory analyses revealed that greater anhedonia severity measured by the SHAPS was related to greater trait and state use of dampening appraisals and reduced use of trait and state amplifying appraisals. However, SHAPS anhedonia severity did not moderate the impact of the dampening and amplifying manipulations on affective experience. While these exploratory analyses were not optimally powered to detect a moderating relationship, they nevertheless suggest a potentially important nuance in how the mechanistic link between appraisal style and anhedonia should be understood. A distinction can be drawn between how often an individual engages in a particular appraisal style and how potent the affective consequences of this appraisal style are. Anhedonic adolescents are more likely to engage in dampening, and less likely to engage in amplifying appraisals. However, when anhedonic adolescents do engage in these appraisals, the affective consequences appear to be no different than in non-anhedonic individuals.

The present results if replicated in clinically depressed populations may be of clinical relevance, given the increasing recognition that anhedonia is often a precursor to adolescent clinical depression and is a core feature of adolescent depression once established. Dampening appraisals may be one factor maintaining anhedonia in adolescents that could be targeted in treatment, for example using conventional cognitive challenge techniques from

cognitive behavioural therapy (CBT; e.g. Goodyer et al., 2017) or cognitive defusion techniques from Acceptance and Commitment Therapy (ACT; see Hayes, Boyd, & Sewell, 2011).

These findings are best considered as a conceptual replication of findings in young adults (Dunn et al., 2018) in adolescents. There is increasing recognition of the importance of conceptual replication of this kind in scientific research (e.g., Zwaan, Etz, Lucas & Donnellan, 2018). This may be particularly important in psychology given that many psychological phenomena are moderated by contextual and individual differences factors (see Dunn, Brown, O'Mahen & Wright, submitted). Here we show that age may be an important moderating factor of the consequences of positive appraisal style.

There are a number of limitations with the present work. The experimental manipulation may be vulnerable to demand effects and we indexed affective experience solely in terms of self-report. The paradigm also lacks ecological validity. Therefore, the findings require replication using more objective measures of emotional response and using a more ecologically valid procedure (cf. Burr et al., 2017). As in adults, it is unclear if the dampening manipulation alters affective experience as a result of enhancing dampening appraisals, lowering amplifying appraisals or a combination of the two. This issues requires further investigation. Future research should also examine if these findings extend to the anticipatory domain and investigate other elements of anhedonia beyond 'liking', including motivation ('wanting') and changes in behaviour/thinking following rewards ('learning') (Berridge & Kringelbach, 2008).

In summary, the present study provides the first evidence that dampening appraisals may drive altered affective experience to positive material in adolescents. This replicates and extends work in adult populations and tentatively suggests that treatments aiming to repair anhedonic symptoms in adolescents may be enhanced if they target dampening appraisals.

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Footnotes

1 - The present sample has very little overlap in age with previous work conducted in young adults. The Dunn et al. (2018) sample had a mean age of 23, a standard deviation of 6.16 and ranged in age from 18 to 43. 85/90 participants were at least twenty years of age. Therefore, there is a distinct developmental difference between the mid-adolescent sample studied here and the young adult sample used by Dunn et al. (2018).

References

Auerbach, R. P., Millner, A. J., Stewart, J. G., & Esposito, E. C. (2015). Identifying differences between depressed adolescent suicide ideators and attempters. *Journal of Affective Disorders, 186*, 127–133.

Bastin, M., Nelis, S., Raes, F., Vasey, M. W., & Bijttebier, P. (2018). Party Pooper or Life of the Party: Dampening and Enhancing of Positive Affect in a Peer Context. *Journal of Abnormal Child Psychology, 46*, 399–414.

Bennett, D. S., Ambrosini, P. J., Kudes, D., Metz, C., & Rabinovich, H. (2005). Gender differences in adolescent depression: Do symptoms differ for boys and girls? *Journal of Affective Disorders, 89*, 35–44.

Berridge, K. C., & Kringelbach, M. L. (2008). Affective neuroscience of pleasure: reward in humans and animals. *Psychopharmacology, 199*, 457–480.

Blakemore, S. J. (2008) The social brain in adolescence. *Nature Reviews Neuroscience, 9*, 267–77.

Burr, L.-A., Javaid, M., Jell, G., Werner-Seidler, A., & Dunn, B. D. (2017). Turning lemonade into lemons: Dampening appraisals reduce positive affect and increase negative affect during positive activity scheduling. *Behaviour Research and Therapy, 91*, 91–101.

Carl, J. R., Soskin, D. P., Kerns, C., & Barlow, D. H. (2013). Positive emotion regulation in emotional disorders: A theoretical review. *Clinical Psychology Review, 33*, 343–360.

Carver, C. S., & White, T. L. (1994). Behavioral inhibition, behavioral activation, and affective responses to impending reward and punishment: The BIS/BAS Scales. *Journal of Personality and Social Psychology, 67*, 319–333.

Crone, A .A ., & Steinbeis, N. (2017). Neural perspectives on cognitive control development during childhood and adolescence. *Trends in Cognitive Science, 21*, 2015-215.

Dempsey, R. C., Gooding, P. A., & Jones, S. H. (2011). Positive and negative cognitive style correlates of the vulnerability to hypomania. *Journal of Clinical Psychology, 67*, 673–690.

Dunn, B. D. (2017). Opportunities and Challenges for the Emerging Field of Positive Emotion Regulation: A Commentary on the Special Edition on Positive Emotions and Cognitions in Clinical Psychology. *Cognitive Therapy and Research, 41*, 469–478.

Dunn, B. D., O'Mahen, H., Wright, K., & Brown, G. (submitted). A commentary on research rigour in clinical psychological science: How to avoid throwing out the innovation baby with the research credibility bath water in the depressed field.

Dunn, B. D., Burr, L. A., Smith, H. B., Hunt, A., Dadgostar, D., Dalglish, L., … Werner-Seidler, A. (2018). Turning gold into lead: Dampening appraisals reduce happiness and pleasantness and increase sadness during anticipation and recall of pleasant activities in the laboratory. *Behaviour Research and Therapy, 107*, 19–33.

Feldman, G. C., Joormann, J., & Johnson, S. L. (2008). Responses to Positive Affect: A Self-Report Measure of Rumination and Dampening. *Cognitive Therapy and Research, 32*, 507–525.

Forbes, E. E., & Dahl, R. E. (2012). Research Review: Altered reward function in adolescent depression: what, when and how? Journal of Child Psychology and Psychiatry, 53, 3–15.

Franken, I. H. A., Rassin, E., & Muris, P. (2007). The assessment of anhedonia in clinical and non-clinical populations: Further validation of the Snaith–Hamilton Pleasure Scale (SHAPS). *Journal of Affective Disorders, 99*, 83–89.

Gilbert, K. E. (2012). The neglected role of positive emotion in adolescent psychopathology. *Clinical Psychology Review, 32*, 467–481.

Gilbert, K., Luking, K., Pagliaccio, D., Luby, J., & Barch, D. (2017). Dampening, Positive Rumination, and Positive Life Events: Associations with Depressive Symptoms in Children at Risk for Depression. *Cognitive Therapy and Research, 41*, 31–42.

Goodyer, I. M., Reynolds, S., Barrett, B., Byford, S., Dubicka, B., Hill, J., … Fonagy, P. (2017). Cognitive behavioural therapy and short-term psychoanalytical psychotherapy versus a brief psychosocial intervention in adolescents with unipolar major depressive disorder (IMPACT): a multicentre, pragmatic, observer-blind, randomised controlled superiority trial. *The Lancet Psychiatry, 4*, 109–119.

Hayes, L., Boyd, C. P., & Sewell, J. (2011). Acceptance and Commitment Therapy for the Treatment of Adolescent Depression: A Pilot Study in a Psychiatric Outpatient Setting. *Mindfulness, 2*, 86–94.

Holmes, E. A., Ghaderi, A., Harmer, C. J., Ramchandani, P. G., Cuijpers, P., Morrison, A. P., … Craske, M. G. (2018). The Lancet Psychiatry Commission on psychological treatments research in tomorrow's science. *The Lancet Psychiatry, 5*, 237–286.

Insel, T., Cuthbert, B., Garvey, M., Heinssen, R., Pine, D. S., Quinn, K., … Wang, P. (2010). Research Domain Criteria (RDoC): Toward a New Classification Framework for Research on Mental Disorders. *American Journal of Psychiatry, 167*, 748–751.

Leventhal, A. M., Unger, J. B., Audrain-McGovern, J., Sussman, S., Volk, H. E., & Strong, D. R. (2015). Measuring Anhedonia in Adolescents: A Psychometric Analysis. *Journal of Personality Assessment, 97*, 506–514.

McMakin, D. L., Olino, T. M., Porta, G., Dietz, L. J., Emslie, G., Clarke, G., … Brent, D. A. (2012). Anhedonia predicts poorer recovery among youth with selective serotonin reuptake inhibitor treatment–resistant depression. *Journal of the American Academy of Child & Adolescent Psychiatry, 51*, 404–411.

Nelis, S., Bastin, M., Raes, F., & Bijttebier, P. (2018). When Do Good Things Lift You Up? Dampening, Enhancing, and Uplifts in Relation To Depressive and Anhedonic Symptoms in Early Adolescence. *Journal of Youth and Adolescence, 47*, 1712–1730.

Nelis, S., Holmes, E. A., & Raes, F. (2015). Response Styles to Positive Affect and Depression: Concurrent and Prospective Associations in a Community Sample. *Cognitive Therapy and Research, 39*, 480–491.

Paulus, M. P., Stein, M. B., Craske, M. G., Bookheimer, S., Taylor, C. T., Simmons, A. N., … Fan, B. (2017). Latent variable analysis of positive and negative valence processing focused on symptom and behavioral units of analysis in mood and anxiety disorders. *Journal of Affective Disorders, 216*, 17–29.

Paus, T. (2005). Mapping brain maturation and cognitive development during adolescence. *Trends in Cognitive Sciences, 9*, 60–8.

Quoidbach, J., Mikolajczak, M., & Gross, J. J. (2015). Positive interventions: An emotion regulation perspective. *Psychological Bulletin, 141*, 655–693.

Snaith, R. P., Hamilton, M., Morley, S., Humayan, A., Hargreaves, D., & Trigwell, P. (1995). A Scale for the Assessment of Hedonic Tone the Snaith–Hamilton Pleasure Scale. *British Journal of Psychiatry, 167*, 99–103.

Sørensen, M. J., Nissen, J. B., Mors, O., & Thomsen, P. H. (2005). Age and gender differences in depressive symptomatology and comorbidity: An incident sample of psychiatrically admitted children. *Journal of Affective Disorders, 84*, 85–91.

Skinner, E.A. & Zimmer-Gembeck, M.J. (2016). *Age Differences and Changes in Ways of Coping across Childhood and Adolescence The Development of Coping.* Springer, p. 53–62.

Thapar, A., Collishaw S, Pine, D.S., & Thapar, A. K. (2012). Depression in adolescence. *Lancet, 379*, 1056-1067

Verstraeten, K., Vasey, M. W., Raes, F., & Bijttebier, P. (2012). The mediational role of responses to positive affect in the association between temperament and (hypo)manic symptoms in children. *Cognitive Therapy & Research, 36*, 768–775.

Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology, 54*, 1063–1070.

Werner-Seidler, A., Banks, R., Dunn, B. D., & Moulds, M. L. (2013). An investigation of the relationship between positive affect regulation and depression. *Behaviour Research and Therapy, 51*, 46–56.

Zwaan, R. A., Lucas, R. E., Donnellan, M. B. (2017). Making replication mainstream. *Behavioural and Brain Sciences, 41*, e120.

Tables

Table 1

Demographic and clinical characteristics of participants and baseline mood ratings per condition.

	Experimental Condition			
	Amplifying *n* = 29	Dampening *n* = 31	Control *n* = 29	Group comparison
Age	15.72 (1.38)	15.69 (1.36)	16.15 (1.37)	$F = 1.04$, $p = 0.36$
Gender (Female %)	76	77	62	$X^2 < 1$
Ethnicity (White %)	90	94	97	$X^2 < 1$
Anhedonia	31.17 (6.21)	31.61 (5.16)	32.66 (5.03)	$F < 1$
MDD	9.28 (6.12)	8.2 (3.98)	7.48 (4.82)	$F < 1$
SP	14.07 (6.14)	13.39 (7.02)	13.48 (5.79)	$F < 1$
GAD	5.97 (3.59)	5.45 (3.50)	6.14 (3.61)	$F < 1$
Trait-Amplifying	21.52 (5.56)	22.58 (4.46)	21.69 (5.44)	$F < 1$
Trait-Dampening	15.62 (5.30)	14.55 (4.57)	14.52 (4.45)	$F < 1$

Note. Data are mean (one standard deviation) values unless otherwise stated.

Table 2

State-appraisal and mood ratings before and after each memory broken down by condition.

		Experimental Condition		
	Time	Amplifying	Dampening	Control
Amplifying	First memory	15.07 (5.23)	15.39 (4.35)	16.07 (5.30)
	Second memory	17.28 (5.77)	12.90 (5.28)	17.41 (4.73)
Dampening	First memory	11.59 (3.98)	10.58 (3.37)	10.48 (3.26)
	Second memory	11.62 (4.57)	13.55 (4.67)	9.72 (2.51)
Happiness	Rest - Recall 1	49.69 (22.58)	53.97 (23.09)	55.03 (20.10)
	Post - Recall 1	78.45 (19.06)	79.77 (15.99)	77.28 (16.15)
	Rest - Recall 2	46.17 (23.78)	44.29 (25.90)	50.34 (22.49)
	Post - Recall 2	73.14 (26.33)	45.58 (31.06)	77.52 (18.33)
Sadness	Rest - Recall 1	10.76 (18.4)	15.90 (20.83)	10.00 (11.20)
	Post - Recall 1	13.38 (16.95)	10.06 (13.65)	7.72 (11.35)
	Rest - Recall 2	15.48 (20.74)	16.23 (20.54)	9.86 (15.92)
	Post - Recall 2	12.86 (18.02)	36.26 (28.56)	6.03 (9.018)

Note. Data are mean (one standard deviation) values.

Figures

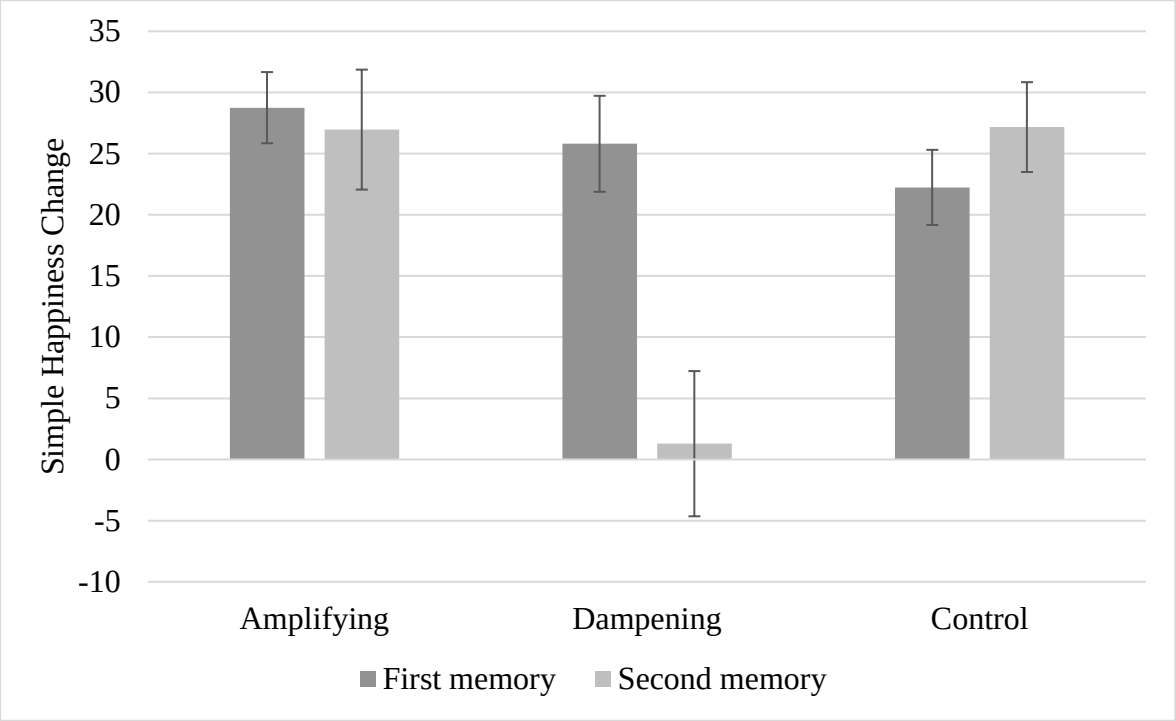

Figure 1. Change in happiness during first and second memory recall broken down by the condition. Data represented are mean (one standard error of the mean) values.

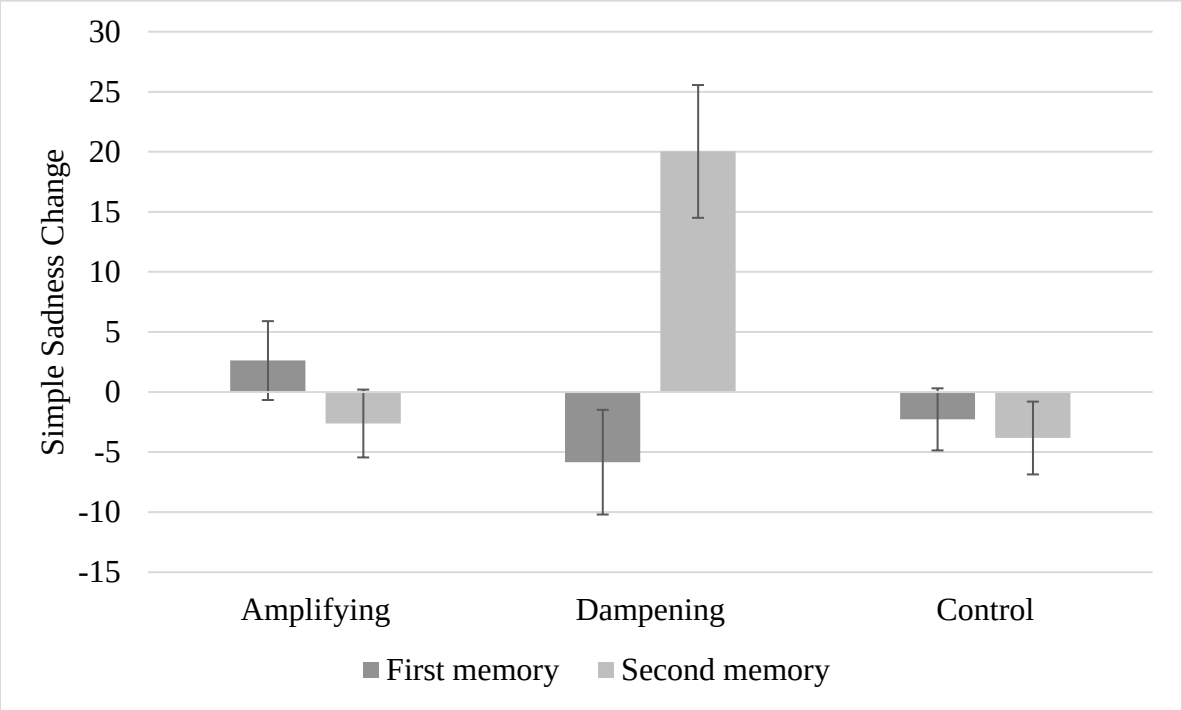

Figure 2. Change in sadness during first and second memory recall broken down by the condition. Data represented are mean (one standard error of the mean) values.

Supplementary Materials For Yilmaz et al. "Making the worst of a good job: Induced dampening appraisals blunt happiness and increase sadness in adolescents during pleasant memory recall"

Detailed Description of Questionnaire Measures and Experimental Task

Questionnaire Measures

Anhedonia. The Snaith—Hamilton Pleasure Scale (SHAPS; Snaith et al., 1995) was used to index anhedonia. This is a 14-item measure of ability to experience pleasure from hobbies, social interactions, sensory experience, and food in the last few days (e.g., "I would find pleasure in my hobbies or pastimes"). Participants rate to what extent they agree with each statement on a scale ranging from 1 (Strongly agree) to 4 (Strongly disagree). The SHAPS has been validated for use in adolescents aged 14 to 16 (Leventhal et al., 2015). Total anhedonia scores were computed by summing up individual item scores (following the continuous scoring method developed by Franken, Rassin, & Muris, 2007), with higher scores indicating increased levels of anhedonia. Psychometric studies indicate the scale is moderately correlated with other measures of PA and has acceptable reliability in adolescent samples (Cronbach's α = 0.87; Leventhal et al., 2015). In the present sample the reliability was broadly comparable (α = 0.84).

Positive appraisal style. The Responses to Positive Affect Scale for Children (RPA-C; Verstraeten, Vasey, Raes, & Bijttebier, 2012) was used to measure trait appraisal style in response to PA. This consists of 17 self-report items examining the extent to which individuals respond to PA by using emotion-focus amplifying appraisals (five items; e.g., "notice how you feel full of energy"), self-focus amplifying appraisals (four items; e.g., "think 'I am the best I could be.'"), and dampening appraisals (eight items; e.g., "think about

the things that have not gone well for you"). Participants rate the extent to which they appraise positive emotion experience in the way described by each item on a scale ranging from 1 (Almost never) to 4 (Almost always). Responses to subscale items were summed to create total scores for each, with higher scores reflecting greater engagement with the given appraisal style. We collapsed the EF and SF scales into a single amplifying dimension. In the present data, internal reliability was adequate (α = 0.84 for amplifying and α = 0.82 for dampening subscales).

The RPA-C was also modified to measure state appraisal style during each memory recall. Instructions were altered to ask participants to judge for each statement "When just recalling that memory, to what extent did you think or feel the following way?" We followed the two-factor amplifying and dampening structure reported for the state-RPA in Dunn et al. (2018). Reliability of the both state scales was adequate (amplifying: first memory α = 0.82, second memory α = 0.89*;* dampening*:* first memory α = 0.71, second memory α = 0.79).

Experimental Task

The experimental task was based on the methodology described by Dunn et al. (2018), but adapted for adolescents. The task was piloted with four adolescents prior to the experiment starting to check it was acceptable and feasible. The task was programmed in Microsoft Visual Studio Express and run on a laptop with a 15" screen in a quiet testing room. The experimenter guided each participant through on-screen instructions that were shown at different stages of the task.

At the beginning of the testing session, participants identified two positive autobiographical memories and chose a cue word that could be used to prompt recall of each memory. The age or intensity of the memories to be recalled were not restricted. The computerised task prompted and guided recall of these memories. The cue words were

entered into the task, which randomly chose one to prompt recall of the first (uninstructed) memory and one to be used to prompt recall of the second (instructed) memory.

To assess mood before recalling the uninstructed memory, participants were asked to relax for 30 seconds. Participants rated their happiness and sadness experience on average during this resting period, using 100 point sliding visual analogue scales ranging from 1 (not at all) to 100 (extremely)[1]. Participants were then shown one of their two cue words and asked to recall that memory "as you naturally would and as vividly as possible in your mind" for two minutes while writing down their stream of consciousness (adapting method reported by Dalgleish, Yiend, Schweizer, & Dunn, 2009). Participants then rated their average happiness and sadness experience during the memory recall and completed the state modified RPA to measure spontaneous use of amplifying and dampening appraisals during the first memory.

Next, participants watched a three-minute video of moving abstract shapes (Gross & Levenson, 1995). This was intended as a neutral mood 'washout' task to return participants to baseline before recalling the second memory. To assess baseline mood prior to the second recall, participants again relaxed for 30 seconds and rated their levels of happiness and sadness when doing so. They were then given instructions about how to recall the second memory.

Participants who were randomised into the amplifying condition were told: "*As you recall this memory, think about any positive feelings as the start of good things to come, think about how you are living up to your potential and concentrate on how happy you feel*". Along with the cue word, the following prompts were presented on the screen for the duration of the two-minute recall period "*Focus on your positive emotion experience during this memory recall; Attend to: How happy you feel, how strong you feel, how you feel up to doing anything, try to focus on enjoying this moment*".

Participants who were randomised into the dampening condition were told: "*As you recall this memory, think about any feelings of positivity experienced are too good to last, why you don't deserve these positive feelings and what could go wrong as a result of these positive feelings*". A cue word was presented on the screen along with the following prompts for the two minutes recall period "*Dampen your positive experience during this memory recall. Focus on why any positive feelings you are experiencing are: Too good to be true, won't last, are undeserved, and will make things go wrong*".

Participants in the control condition received identical instructions during the second memory as during the first memory. Participants again wrote down their stream of consciousness during the memory, rated their mood as described above, and completed the modified RPA to assess their appraisal style during the second memory.

At the end of the experiment, all participants watched a two-minute amusing clip from the movie *Bruce Almighty* (as described in Uhrig et al., 2016). This was intended to ensure all participants were in a positive frame of mind before finishing the testing session. Content and suitability of both videos to the target population were piloted prior to data collection on four adolescents.

An independent rater, blind to which condition participants had been allocated to, inspected each cue word and the written narratives to determine if the memories recalled were positive in nature. All memories were judged to be linked to positive events, so no participants were excluded on this basis. The kind of memories participants chose to recall included holidays, activities with family and friends, pets and academic achievements.