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Optimism and mental imagery: A possible cognitive marker to promote well-being?

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ABSTRACT

Optimism is associated with a range of benefits not only for general well-being, but also for mental and physical health. The development of psychological interventions to boost optimism derived from cognitive science would have the potential to provide significant public health benefits, yet cognitive markers of optimism are little understood. The current study aimed to take a first step in this direction by identifying a cognitive marker for optimism that could provide a modifiable target for innovative interventions. In particular we predicted that the ability to generate vivid positive mental imagery of the future would be associated with dispositional optimism. A community sample of 237 participants completed a survey comprising measures of mental imagery and optimism, and socio-demographic information. Vividness of positive future imagery was significantly associated with optimism, even when adjusting for socio-demographic factors and everyday imagery use. The ability to generate vivid mental imagery of positive future events may provide a modifiable cognitive marker of optimism. Boosting positive future imagery could provide a cognitive target for treatment innovations to promote optimism, with implications for mental health and even physical well-being.

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1. Introduction

Why is it that some people see the future as bright and full of potential, whereas for others it holds only uncertainty or apprehension? Dispositional optimism refers to the tendency to have generalized positive expectancies about the future (Carver et al., 2010). Most people show an "optimism bias", expecting positive events rather than negative events to happen in the future, even without supporting evidence (Weinstein, 1980).

It has been argued that optimism is adaptive and an important product of human evolution (Sharot, 2011). An increasing body of evidence suggests that optimism has an impact not only on general well-being, but also on mental and physical health (Carver et al., 2010). Longitudinal studies have demonstrated that higher levels of optimism are associated with lower cumulative incidence of depression symptoms over a 15-year period (Giltay et al., 2006b), with reduced risk of future cardiovascular disease in a range of populations (Giltay et al., 2006a; Tindle et al., 2009; Boehm et al., 2011),

and even with reduced rate of death (Giltay et al., 2004). Optimism is thus linked to positive outcomes in areas that represent huge public burdens such as depression and cardiovascular disease (World Health Organization, 2008). In the context of the need to develop inexpensive and accessible treatment options (Simon and Ludman, 2009), optimism presents a target for a low-intensity psychological interventions in these high-priority areas.

Although some potential psychological interventions to increase optimism have been described (e.g. Riskind et al., 1996; Meevissen et al., 2011), the development of novel interventions for optimism is most likely to be successful if it is rooted in an understanding of the basic underlying processes, and this is currently lacking. Developing an understanding of the cognitive and emotional processes underlying optimism using an "experimental medicine" approach (Rutter and Plomin, 2009) could drive more targeted treatment innovation. This corresponds to the "basic science discovery" phase in the development of new interventions (Thornicroft et al., 2011).

A potential neural substrate for optimism has been suggested. Sharot et al. (2007) found increased activation in the right anterior cingulate cortex (rACC) when participants imagined positive future events, compared to when they imagined negative

future events. Furthermore, this relative level of rACC activation was greater for participants with higher levels of self-reported optimism. While the identification of brain regions per se does not easily lend itself to novel treatment development, this study suggests a potentially modifiable cognitive marker: the paradigm used involved the generation of mental imagery, that is, imagining autobiographical episodes.

We propose that a candidate cognitive marker for optimism is the ability to generate vivid mental images of positive events occurring in the future. Imagining the future may play a key role in our day-to-day functioning and has been the subject of much recent research interest (e.g. Schacter et al., 2008; Addis et al., 2009; Crisp et al., 2011; D'Argembeau et al., 2011). Compared to verbal thought, mental imagery has a powerful effect on emotion (Holmes and Mathews, 2005; Holmes et al., 2008), and thus mental images may be a particularly powerful form of future thinking. What evidence might support our hypothesis? Sharot et al. (2007) found that participants reporting higher levels of optimism were more likely to expect the positive events they imagined to happen closer in the future than negative events, and were more likely to imagine them with a greater sense of "pre-experiencing". On the other hand, people with depressed mood showed reduced ability to generate vivid mental images of positive future events (Holmes et al., 2008). Further, Morina et al. (2011) found that patients with major depressive disorder and those with anxiety disorders showed reduced ability to generate vivid mental images of positive future events compared to healthy controls, and also rated the events as less likely to occur in the near future.

Support for a link between imagery of the future and optimism also comes from experimental studies that have investigated the potential of imagery tasks to boost optimism. Meevissen et al. (2011) investigated the impact on optimism of practising a "Best Possible Self" (BPS) imagery exercise every day for 2 weeks. This built on work by Fosnaugh et al. (2010) demonstrating that optimism was manipulable in an experimental setting, and a subsequent study by Peters et al. (2010) that showed an immediate impact on optimism of engaging in a BPS imagery exercise. The BPS imagery exercise involved imagining a future self in which everything had turned out in the most optimal way. In the study by Meevissen et al. (2011), participants were asked to repeat the imagery exercise for 5 min each day at home over a 2-week period. In a control condition participants instead carried out the imagery exercise about their daily activities in the past 24 h. Participants in the BPS imagery condition ($n=28$) showed significant increases in self-reported optimism over the 2 weeks, whereas participants in the control condition ($n=26$) did not show this increase. This therefore provides some evidence that engaging in positive future imagery may lead to increases in optimism in the short term, whereas engaging in past imagery does not.

There is therefore convergent evidence from both ends of the optimism spectrum to suggest that positive future imagery may be important, and from experimental studies that deliberate engagement in positive future imagery can increase optimism. However, a fundamental part of the puzzle is missing. That is, is optimism in fact associated with greater ability to generate vivid mental images of positive events in the future? At first glance it may sound self-evident that people who can more easily imagine a positive future would be more optimistic, but strikingly this has not been put to the test, and in fact the widely used measure of optimism, the Life Orientation Test-Revised (LOT-R; Scheier et al., 1994), makes no mention of positive imagination per se. Even in the study by Meevissen et al. (2011) described above, as both the experimental conditions involved engaging in imagery, the study cannot demonstrate whether the imagery component of the

exercise was crucial for the effects of the task (as opposed to simply thinking about positive futures), or whether the increase in optimism observed in the experimental group was the result of specific cognitive changes such as increased accessibility of positive future imagery. The key hypothesised link between optimism and vividness of positive future imagery therefore remains untested.

The current study aimed to test the hypothesis that within a community sample, higher levels of optimism would be associated with the ability to generate more vivid mental imagery of positive future events, as measured by vividness ratings on the Prospective Imagery Test (PIT). We predicted that this relationship would remain significant when adjusting for other potentially confounding variables. The study further aimed to extend the findings of Sharot et al. (2007) by investigating the relationship between the sense of likelihood and pre-experiencing of future imagery and optimism, by adding ratings of likelihood and experiencing to the PIT.

2. Method

2.1. Participants

The study sample was drawn from the Routine Outcome Monitoring (ROM; de Beurs et al., 2011) reference study (Schulte-van Maaren et al., 2012). The ROM reference study comprised a population-based sample of Dutch participants aged 18–65, randomly selected from registration systems of eight general practitioners (GPs) in the province of South-Holland, the Netherlands. In the Netherlands, 99.9% of the general population is registered with a GP, and thus non-consulting GP patients provide a good representation of the general population. The ROM reference group was stratified according to the composition of the ROM patient group (regarding age, gender, and urbanization). As a reference sample, participants with cognitive difficulties such as dementia or who had received treatment for a psychiatric disorder within the past 6 months were excluded. The 547 people in the reference study who had agreed to be contacted for research were invited by letter to participate, with the questionnaires and return envelope enclosed, and 258 elected to take part.[1] Twenty-one participants returned incomplete questionnaires and were excluded, leaving a final sample of 237 (152 men and 85 women).

2.2. Measures

Socio-demographic variables (e.g. age, gender, education) were collected as part of the ROM reference study. For the current study, participants further completed the following questionnaires.

2.2.1. Life Orientation Test-Revised (LOT-R; Scheier et al., 1994).

This 10-item questionnaire was used to assess dispositional optimism. Items were rated on a 5-point scale from 0 (strongly disagree) to 4 (strongly agree). Three items were positively worded (e.g. "I'm always optimistic about my future"), and three were negatively worded and reverse-scored (e.g. "I hardly ever expect things to go my way"). Four items were filler, and participants' responses to these were not used in calculating their score. Higher total scores (ranging from 0 through 24) were indicative of higher levels of optimism. Although some have argued that the positively worded and negatively worded items on the LOT-R should be scored separately to generate separate optimism and pessimism scales (e.g. Kubzansky et al., 2004), we used the original scoring as described by the authors of the scale, consistent with other studies investigating optimism in the context of mental imagery (e.g. Sharot et al., 2007; Meevissen et al., 2011). The LOT-R has been used in numerous studies investigating optimism (Carver et al., 2010), and Scheier et al.

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[1] There were no significant differences in socio-demographic characteristics of those who did or did not respond to the invitation to take part in the study, with the exception of nationality and age. Thus, the sample for the current study was broadly representative of the ROM reference sample as a whole, except that responders were significantly more likely to be Dutch, $\chi^2(1,457)=6.52$, $P=0.01$, and were significantly older, $t(545)=4.90$, $P<0.001$, than non-responders. All other Ps were >0.10, with the exception of gender, where there was a trend for a greater proportion of responders to be male than non-responders, $\chi^2(1,457)=3.54$, $P=0.06$. The ROM reference study had also included the LOT-R, and there were no differences between responders and non-responders on this prior administration, $t(544)<1$.