Learning to Learn from Positive Experiences

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Abstract

People draw on psychological resources such as gratitude to cope with adversity and maintain well-being. These resources must largely be acquired, and studies have identified environmental and behavioral factors of this learning. Yet little research has investigated how people can be active agents in this process by how they engage their experiences of psychological resources. Consequently, the HEAL framework was developed to organize numerous 'mental engagement factors,' and the Taking in the Good Course (TGC) was created to explore their use. In a multiple arm, pre-post intervention study, TGC participants reported significant increases in composite measures of Cognitive Resources, Positive Emotions, and Total Happiness, and decreases in a composite measure of Negative Emotions; these results persisted two months after the course ended. These findings suggest that people can learn how to heighten the internalization of beneficial experiences, with implications for improving responses to treatment and the development of psychological resources.

Keywords: social-emotional learning, neuroplasticity, emotional intelligence, mindfulness, positive emotions

Psychological resources

Durable psychological resources such as trait mindfulness help us to cope and thrive (Fogarty et al., 2013; Shapiro et al., 2011). They have been described in various ways, such as character strengths (Park et al., 2004), virtues (Dahlsgaard et al., 2005), psychological capital (Luthans & Youssef-Morgan, 2017), and positive psychological traits (Martin et al., 2015). Examples include interpersonal skills, impulse control, positive mood, new perspectives gained through psychotherapy or coaching, grit, gratitude, and a deeper commitment to sobriety for someone in recovery.

To a large extent, our inner resources are acquired rather than innate (Roberts et al., 2006; Skinner & Zimmer-Gembeck, 2007). This acquisition is a two-stage process of social-emotional learning, broadly speaking, in which the neural correlates of experiences are encoded into lasting changes in the brain (Josselyn et al., 2015); for simplicity, we term the first stage ‘activation’ and the second stage ‘internalization.’ People develop greater trait compassion, for example, by having experiences of compassion and related factors (e.g., empathy for suffering) that lead to enduring alterations in neural structure and function. There is considerable individual variation in the development of psychological resources from the experiences people have in both formal interventions and everyday life. What could promote their development?

Factors of social-emotional learning

Physiological (Zalta et al., 2013), environmental (O’Brien, 2009), and behavioral (Kerner & Fitzpatrick, 2007) factors can heighten social-emotional learning, including in clinical settings. Additionally, mental factors have been identified that are broad personality,

temperamental, or motivational attributes which typically operate in the background of awareness. These 'global' factors include a growth mindset (Dweck, 2006), vantage sensitivity (Pluess & Belsky, 2013), the metatrait of plasticity (Hirsh et al., 2009), and mindfulness (Langer, 2016). Besides such global factors, what could be called 'mental engagement factors' may also be useful. These factors can be applied deliberately to regulate experiences directly in order to support the second, internalization phase of learning and thus heighten the acquisition of psychological resources. Examples include extending the duration of an experience, focusing on its rewarding qualities (Wise, 2004), and appreciating its personal relevance (Cunningham, et al., 2010).

Mental engagement factors

Mental engagement factors could have particular benefits. First, they can be mobilized rapidly through deliberate effort, unlike global factors that are more stable and less subject to volitional control in the moment. Second, engagement factors have direct regulatory involvement with experiences (e.g., Quoidbach et al., 2015), thereby potentially increasing a person's influence over them and thus what is gained from them. Third, learning depends mainly on neural activity during an experience (Craik & Lockhart, 1972; Takeuchi et al., 2014), and engagement factors influence specific processes of encoding and consolidation while experiences are occurring. Fourth, using engagement factors could increase an individual's sense of being an active agent in the acquisition of psychological resources, which might increase motivation and feeling of 'ownership' of the results. Last, engagement factors can be applied in relatively brief experiential episodes such as over the course of a single breath. Consequently, people could use them to heighten the internalization of

specific beneficial experiences many times a day.

In academic settings, engagement factors have been used to improve educational outcomes (e.g., deepening semantic processing; Craik, 2002), and they have been taught explicitly so that students will 'learn [how] to learn' (Okros, 2020; Smith, 1990). But despite their potential benefits, little scholarly attention has been paid to the use of engagement factors in the development of social-emotional resources such as resilience or self-worth. Nor can we find any systematic efforts to instruct people in these skills in clinical settings, or more broadly in programs or trainings aimed at personal development and human potential.

For example, studies have shown the value of identifying and using psychological resources such as character strengths (e.g., Peterson & Seligman, 2004), but this does not address how to *develop* them in the first place. There have also been efforts to foster – to 'activate' – various beneficial experiences such as positive emotions (e.g., Fredrickson, 2013). One experience could lead to another (sometimes in the form of experience → action/event → experience) in 'upward spirals' (Garland et al., 2010). Still, as valuable as they may be at the time, experiences – states of mind – are transient as well as dependent upon situational factors. Traits are more stable and reliable than states (Matthews et al., 2003). In particular, when external supports fall away and familiar activities are less available – whether due to personal challenges or to societal issues such as a pandemic – we are left internally with whatever psychological resources we have already acquired.

Further, during this acquisition, experiences alone do not produce durable inner resources. There must also be the crucial second stage of learning in which lasting changes occur in the nervous system. This learning may occur 'incidentally' (e.g., as described in the

broaden-and-build theory of positive emotions; Fredrickson, 2004). For example, savoring (Bryant & Veroff, 2017) can deepen the enjoyment of experiences as they are occurring, which might promote incidental learning from them; nonetheless, the function of savoring is generally not described as a means to the end of deliberately developing specific psychological resources. Overall, the rate of incidental learning from positive experiences is likely low. Otherwise, one would expect to see a more steeply upward trend in individual well-being over the lifespan than is widely evident, given the fact that most people report mainly neutral to positive experiences throughout the day (Carstensen et al., 2000).

How might we be *active* agents inside our own minds in the building of durable inner resources?

The HEAL framework

Individual engagement factors may be present in various psychotherapies, psychosocial programs, and personal growth trainings. But to our knowledge they have not been gathered together in a single framework and used systematically. To explore this opportunity, the first author developed the HEAL framework (Hanson, 2013), with these four steps:

Activation

1. Have a beneficial experience.

Internalization

2. Enrich it.[1]
3. Absorb it.
4. Link positive and negative material. (optional)

This framework is the basis of the Taking in the Good Course investigated in this study and in other research (Jacob & DeGuzman, 2016). A summary of each step follows, with an emphasis on the internalization phase of learning.

Have a beneficial experience. Beneficial – i.e., enjoyable and/or useful – experiences can occur in two ways: by already having them or by deliberately creating them, such as by calling up a feeling of compassion (Hofmann et al., 2011).

Enrich it. This involves deliberately prolonging, intensifying, and exploring an experience, which presumably affects activity in its neural correlates. Five kinds of mental factors can be used, singly or in combination, to enrich an experience and potentially strengthen its effects on the nervous system:

- Duration – People can deliberately extend the duration of their experiences, including emotionally or somatically rich ones (Waugh et al., 2014). Maintaining attention to stimuli tends to deepen associative learning (Zhu et al., 2018), and sustaining attention to positive stimuli increases the beneficial effects of these stimuli

[1] After the HEAL framework was developed, it was found that Fergus Craik (2002) had previously used the term ‘enriching’ for the elaboration of meaning during encoding.

(Pluess & Belsky, 2013). As material is held longer in working memory, its transfer into long-term memory increases (Ranganath et al., 2005).

- Intensity – We can intensify our experiences through multiple means, including up-regulating emotions (Quoidbach et al., 2015) or imagining that stimuli are physically closer (Kim & Hamann, 2007). As experiences intensify and arousal increases, norepinephrine and cortisol activity in the brain increases as well (McGaugh & Roozendaal, 2009; Sara, 2009). Norepinephrine fosters sustained representation of an experience in working memory (Arnsten & Li, 2005) while also promoting synaptic plasticity in general (Harley, 2007). The amygdala and hippocampus play a major role in learning (Hamann, et al., 1999; Murty, et al., 2010), and both of them have receptors for norepinephrine and cortisol. Increased activity at these receptor sites related to physically- or emotionally-based arousal heightens the formation of explicit and implicit memory (Cahill & McGaugh, 1996). As the intensity of an experience increases, including with positive valence, amygdala activation tends to increase as well (Bonnet et al., 2015), which improves memory formation mediated by both the hippocampus (LaBar & Phelps, 1998) and the caudate nucleus (Cahill & McGaugh, 1996).
- Multi-modality – This term refers to focusing on multiple aspects of an experience, which can be categorized broadly as thoughts, perceptions, emotions, desires, and actions:
    - *Thoughts*. Reflecting on the meaning of an experience engages deeper 'levels of processing' (Craik, 2002), and as this increases, learning and memory tend to increase as well (Ekuni et al., 2011).

  - *Perceptions*. For example, focusing attention on internal sensations such as breathing and heartrate might stimulate the vagus nerve complex (Porges, 2011), and vagal stimulation has been shown to increase certain kinds of learning (Cahill & McGaugh, 1996).
  - *Emotions*. Emotionally rich experiences have heightened encoding (Lee et al., 2015) and more durable consolidation (Talmi, 2013).
  - *Desires*. As the sense of motivationally relevant aspects of an experience increases, amygdala activity tends to increase as well (Olney, et al., 2018), which is associated with increased learning from experiences.
  - *Actions*. Particular postures, facial expressions, gestures, or movements can underlie experiences of psychological resources, e.g., putting a hand on one's heart during a meditation on compassion. Focusing on these actions might strengthen the embodied sense of such resources.

- Novelty – We can look for new aspects of a familiar experience such as feeling appreciated, and as the perceived novelty of an experience increases, so does hippocampal activation (van Elzakker et al., 2008). This signals the ventral tegmental area to release dopamine in the hippocampus, promoting synaptic consolidation and memory formation (Lisman & Grace, 2005). Additionally, novel experiences are associated with heightened hippocampal 'replay' activity and cortical consolidation during sleep (Buhry et al., 2011).
- Salience – We can also deliberately find what is meaningful or important in an experience. Experiences that seem personally relevant tend to have the greatest impact on associative learning (Zhu et al., 2018) and memory consolidation

(McGaugh, 2013). Amygdala activation increases as perceived salience increases (Cunningham et al., 2010), which promotes hippocampus-based memory formation.

Absorb it. To put it metaphorically, enriching is like increasing the amount and concentration of a liquid poured onto a sponge while absorbing is like increasing the receptivity of the sponge itself. Mentally, this step involves intending and sensing that an experience is being taken into oneself and highlighting what is rewarding about it. Neurally, this may prime and sensitize the brain for heightened encoding and consolidation:

- Intending – We tend to remember what we want to remember (Oyarzún, et al., 2016). In particular, the amygdala reacts to stimuli in terms of the motivations of the individual (Cunningham & Brosch, 2012), so intending to internalize an experience may increase amygdala activity related to it, and thus the neural registration of the experience.
- Sensing – Attention turned inward to one's emotional or somatic state engages the insula and anterior cingulate cortex, and this 'interoceptive self-orienting' heightens memory formation (Pais-Vieira et al., 2016).
- Highlighting rewards – As the feeling of reward associated with an experience grows, learning from the experience tends to rise as well (Madan, 2013). Norepinephrine activity increases with reward (Sara & Segal, 1991), which promotes synaptic formation. Dopamine activity also increases with reward (McDonald & Hong, 2013), which in the hippocampus increases protein synthesis and memory formation (Takeuchi et al., 2013).

Link positive and negative material. This step involves focusing on something enjoyable or useful in the foreground of awareness along with related painful or harmful psychological material (e.g., emotions, sensations) in the background. (The Link step is optional because the first three steps alone may help increase the acquisition of trait resources; also, any attention to negative material could be too challenging for someone.) Linking may be beneficial both by associating positive to negative (e.g., relaxation easing anxiety) and by disrupting the reconsolidation of negative material in neural networks (Ecker, 2015).

The current study

To teach people how to use the engagement factors in the HEAL framework, the first author developed the 18-hour Taking in the Good Course, taught in six 3-hour classes, with written handouts for participants. Detailed scripts were used for each class, and these and the handouts are available for review at https://www.rickhanson.net/taking-in-the-good-course-2/. Participants were encouraged to apply the HEAL methods to enjoyable or useful experiences in everyday life, typically for relatively brief periods of time (e.g., for a breath or two), and to approach these experiences with an attitude of receptive appreciation without trying to hold on to them.

A multiple arm, pre-post intervention study design was used to investigate the systematic training of mental engagement factors through the Taking in the Good Course. Our hypotheses were that participants would develop greater psychological resources in at least two key areas: (1) positive emotions due to repeatedly sustaining a focus on emotionally positive experiences, and (2) mindfulness, since the HEAL steps involve repeated applications of attentional control.

Method

Participants

Forty-six people were recruited from the greater San Francisco Bay Area through community advertisements that briefly described the course and its teacher, the first author. Their mean age was 55.2 (SD = 11.0), 84.7% were female, and mean years of education was 17.2 (SD = 2.2). Regarding ethnicity, 82.6% identified as white/Caucasion, 2.2% as Asian, 6.5% as Hispanic, and 8.7% as other.

Procedure

The UC Berkeley committee for the protection of human subjects approved this study. All participants provided informed consent, and they were randomly assigned to the initial Taking in the Good Course (TGC) group or to a waitlist group that took the course later. All participants completed a battery of self-report measures (described below) before the initial group began the TGC ('baseline'). Two people in the initial group and three people in the waitlist group dropped out before the course began. From the initial group, 21 participants provided batteries after TGC ended ('post-course') and 20 did so again two months later ('two-month'); from the waitlist group, 12 participants provided batteries post-course and 10 at two-month follow-up. There were no significant differences in the demographics of the initial and waitlist groups.

Measures

In this exploratory study, we assessed participants with a broad battery of 21 commonly

used self-report measures. We clustered these measures into four groups in order to organize our findings conceptually and to increase statistical power, by constructing z-score based composite indices with equal weights assigned to each measure.

The Cognitive Resources composite included the *Savoring Beliefs Inventory* (SBI; Bryant, 2003), the *Mindful Attention Awareness Scale* (MAAS; Brown & Ryan, 2003), the *Self-Compassion Scale—Short Form* (SCS-SF; Raes et al., 2011), the *Emotion Regulation Questionnaire* (ERQ; Spaapen et al., 2014), the *Gratitude Questionnaire* (GQ-6; McCullough et al., 2002), the *Rosenberg Self-Esteem Scale* (RSES; Rosenberg, 1965), and the *Positive Rumination Scales* (PRS; Feldman et al., 2008).

The Positive Emotions composite was comprised of the seven scales within the *Dispositional Positive Emotion Scales* (DPES; Shiota et al., 2006). These are *Joy*, *Contentment*, *Pride*, *Love*, *Compassion*, *Amusement*, and *Awe.*

The Negative Emotions composite was based on the *Beck Anxiety Inventory* (BAI; Steer et al., 1993) and the *Beck Depression Inventory* (BDI; Beck et al., 1996).

The Total Happiness composite was based on the *Satisfaction with Life Scale* (SWLS; Diener et al., 1985) and the *Subjective Happiness Scale* (SHS; Lyubomirsky & Lepper, 1999).

Cronbach's alpha, a measure of reliability/internal consistency, was calculated for each composite index. The psychometric properties of each of the four composite indices were shown to be internally consistent, as evidenced by the following alpha coefficients: Cognitive Resources (alpha=0.75), Positive Emotions (alpha=0.88), Negative Emotions (alpha=0.76), and Total Happiness (alpha=0.74).

Data analysis

Repeated measures linear mixed models were estimated separately for each of the four composite indices. Mixed models have numerous advantages compared to dependent t-tests or analysis of variance (Field & Wright, 2011). Mixed models do not require balanced data, they utilize all available data (i.e., don't discard incomplete participant data), and they provide valid results when data are missing (i.e., under the missing at random assumption). In this study, each composite index was specified as the dependent variable, three time periods were included as one categorical independent variable (**pre_post** = 'baseline,' 'post_course,' or 'two_month'), and **group** was included as a dichotomous independent variable (**group** = 'initial' or 'waitlist'). Interactions between group and time were also investigated. The repeated measures specification initiates the model to treat the outcome measure taken at three separate time periods as dependent (i.e., not independent) and linked to participant **ID**. Because participants were randomly assigned to groups, the model specifies that the random factor (participant **ID**) is nested within the fixed factor **group**. Post-hoc tests using Tukey's adjustment for multiple comparisons were conducted to compare, for any given composite index, the mean score at each time period to the mean scores at the other two time periods. Finally, repeated measures linear mixed models were run using each of the twenty-one measures as the dependent variable in order to gain a deeper understanding of the impact of TGC on outcomes.

Results

Group differences

Figures 1, 2, 3, and 4 plot the means by group for the Cognitive Resources, Positive Emotions, Negative Emotions, and Total Happiness composites, respectively. The covariate for group was statistically significant for two of the four composites. The waitlist group mean scores were higher than the initial group mean scores in Positive Emotions (p=0.043) and Total Happiness (p=0.02). These results confirm that including group as a covariate in the mixed models was beneficial to model estimation and allowed for more precise estimation of TGC program outcomes. However, there were no statistically significant interactions (between group and outcome) in any model. In other words, there did not appear to be any difference in the benefits of TGC developed in either group. The group differences in Positive Emotions and Total Happiness composites may be an artifact of random assignment.

[FIGURES 1-4 NEAR HERE]

TGC outcomes in composite indices

Table 1 displays the results of the post-hoc tests performed for each composite index. Regarding score differences from baseline to post_course, there were statistically significant improvements in all four composites: Cognitive Resources (p=0.004*)*, Positive Emotions (p=0.009), Negative Emotions (p=0.007), and Total Happiness (p=0.033). At two-months, there were statistically significant improvements in three of four composites, including Cognitive Resources (p=0.039*)*, Negative Emotions (p=0.016), and Total Happiness (p=0.044); the difference in Positive Emotions mean score from baseline to two-months was

borderline significant (p=0.056). Regarding score differences from post_course to two_month, there were no statistically significant differences in all four composites. The interpretation of these results is that the benefits from TGC were rapidly apparent and did not decrease for at least the two-month period after taking the course.

[TABLE 1 NEAR HERE]

TGC outcomes in individual measures

To more fully understand the effects of TGC on outcome measures, a repeated measures linear mixed model was run for each of the twenty-one measures. Table 2 summarizes the statistically significant differences found in the post-hoc tests performed for each measure.

There were significant improvements in many measures at post-course (using Tukey's adjusted p), including the Savoring Beliefs Inventory (p=0.001), Self-Compassion Scale (p=0.013), Emotion Regulation Questionnaire - Reappraisal (p=0.016), Gratitude Questionnaire (p=0.015), Positive Rumination Scale - Emotion-Focus (p=0.009), Dispositional Positive Emotion Scale - Joy (p=0.006), Dispositional Positive Emotion Scale - Contentment (p=0.006), Dispositional Positive Emotion Scale - Love (p=0.027), and Beck Depression Inventory (p=0.002). There were also borderline significant improvements in the Rosenberg Self-Esteem Scale (p=0.069), Positive Rumination Scales - Self-Focus (p=0.099), Dispositional Positive Emotion Scales - Pride (p=0.10), Subjective Happiness Scale (p=0.056), and Satisfaction with Life Scale (p=0.078).

Two months after taking TGC, statistically significant differences from baseline measures were found in the Savoring Beliefs Inventory (p=0.001), Self-Compassion Scale

(p=0.024), Emotion Regulation Questionnaire - Reappraisal (p=0.023), Dispositional Positive Emotion Scale - Joy (p=0.033), Dispositional Positive Emotion Scale - Contentment (p=0.023), and Beck Depression Inventory (p=0.010). There were also borderline significant improvements in the Subjective Happiness Scale (p=0.071) and the Satisfaction with Life Scale (p=0.092). Finally, regarding score differences from post_course to two_month, there were no statistically significant differences in any of the twenty-one measures, which indicates that the benefits of TGC persisted over this period.

[TABLE 2 NEAR HERE]

Discussion

To our knowledge, the HEAL model is the first to organize numerous mental engagement factors in a single framework, and the Taking in the Good Course (TGC) is the first intervention to teach these factors systematically. We explored the potential effects of the TGC on the development of multiple psychological resources, and hypothesized that course participants would experience improvements in both positive emotions and mindfulness.

After taking the course, TGC participants described significant improvements in composite measures of cognitive resources, positive emotions, negative emotions, and total happiness. Two months later, they continued to report significant improvements in cognitive resources, negative emotions, and total happiness, with borderline significant improvements in positive emotions.

In terms of individual measures, after the course, there were significant improvements in savoring, self-compassion, emotional reappraisal, gratitude, positive rumination (emotion focus), joy, contentment, love, as well as significant decreases in

depressed mood. Participants also reported statistically borderline improvements in self-esteem, positive rumination (self focus), pride, happiness, and satisfaction with life. Two months later, statistically significant improvements persisted in savoring, self-compassion, emotional reappraisal, joy, contentment, and mood, with statistically borderline improvements in happiness and satisfaction with life. Overall, most of the psychological resources investigated showed increases that were stable over the four-month period from participants beginning to train in and use mental engagement factors to the final assessment.

It is noteworthy that numerous participants initially scored in the upper ranges of the baseline measures, limiting their potential gains from taking the TGC. It is possible that individuals who were not already approaching a ceiling of mental health (as indicated by the measures used in this study) would show even greater gains from the TGC.

This 'ceiling effect' in our sample could be a reason for the positive trends observed in the development of mindfulness that still fell short of statistical significance. It is also possible that the generally brief periods of focused attention sustained during the installation phase of learning were insufficient to foster gains in trait mindfulness.

In sum, as hypothesized, significant improvements were found in a wide range of psychological resources after taking a course designed to teach methods for increasing durable gains from experiences of such resources. The breadth of these results in a relatively small sample and their stability two months post-intervention suggest that a common underlying factor could be at work—namely, learning how to increase one's learning from positive experiences.

Potential benefits of mental engagement factors

Increasing specific psychological resources. Repeatedly applying engagement factors to experiences of a particular psychological resource may help develop it as a trait, which in turn could foster more experiences of it and thus more opportunities to reinforce it, in a positive cycle. This process could proceed *ad hoc* as a person deepens engagement with various experiences (e.g., feeling cared about by a friend), as they occur naturally over the course of a day. Additionally, a person could purposefully pursue developing a particular inner resource that is matched to an external or internal challenge. For example, one might deliberately look for opportunities to have and internalize experiences of self-worth to help deal with a critical supervisor at work.

Positive side effects. Using engagement factors may help to mobilize other beneficial mental processes, such as taking a stance of support toward oneself, staying in the present (Killingsworth & Gilbert, 2010), or having a sense of agency inside one's mind. During experiences of these other mental processes, engagement factors could be applied to them, too, in order to reinforce them.

Compensating for the negativity bias. While there is an *activation* effect for positive experiences in that they typically outnumber negative ones (Carstensen et al., 2000), there is an *internalization* effect for negative experiences (Baumeister et al., 2001), particularly for nonautobiographical memory (Walker et al., 2003) – the implicit, somatic and emotional residues of lived experience – and in younger individuals (Reed et al., 2014). Further, stressful or emotionally negative experiences tend to sensitize people to such experiences through cortisol-related alterations in the hippocampus and amygdala (Harkness et al., 2015;

Lupien et al., 2015), thus heightening reactivity and fostering additional sensitization in a vicious cycle. In effect, the 'negativity bias' (Rozin & Royzman, 2001) makes us good at learning from bad experiences but relatively bad at learning from good ones, such as experiences of psychological resources. By using mental engagement factors, we can potentially increase the conversion of beneficial states to beneficial traits, and thus compensate for that bias.

Improving response to interventions. In studies on mental health-related interventions – such as psychotherapy, methods in positive psychology (Sin & Lyubomirsky, 2009), or mindfulness training – there is of course variance in their findings. Individuals whose results from an intervention are at the higher end of the range – which could be a primary source of statistical significance – might already be using engagement factors on their own. On the other hand, individuals whose gains are at the lower end of the range may not be using engagement factors or have other characteristics that flatten their growth (e.g., de Villiers et al., 2018), and their gains might be increased by a focus on these factors.

Regarding psychotherapy in particular, the past few decades have seen much research, a focus on evidence-based treatments, and the development of new methods. Nonetheless, there is no clear trend of improvement in therapeutic outcomes. In fact, there are some signs of decline in effect sizes and in the efficiency of methods (Carey et al., 2017; Harvey et al., 2014; Johnsen & Friborg, 2015). There could be multiple reasons for this, including economic stresses during this period. One possible factor is that clients may be having improved therapeutic experiences (both inside and outside of formal treatment), but without any improvement in the lasting changes of neural structure or function that are the basis of durable gains and growth. At this point, developing new therapeutic experiences may have

diminishing returns, with greater opportunities found in helping clients to increase the internalization of the therapeutic experiences they are already having.

Increased sensitivity to positive experiences. Past stresses can impair hippocampal and neurotrophic activity (Duman & Monteggia, 2006), thereby decreasing a person's capacity to learn and grow. Insofar as using engagement factors may help compensate for this impairment, they could increase the brain's functional sensitivity to positive experiences. Further, the regular use of these factors might help sensitize the amygdala to positive stimuli. The amygdala can be sensitized to negative stimuli such as stress or pain (Li et al., 2017; Rajbhandari et al. 2015), and there are preliminary indications that it may be possible to sensitize it to rewarding stimuli, such as by upregulating opioid receptor activity (Bie et al., 2012). Happier people tend to have amygdalae that are more responsive to positive stimuli than the amygdalae of those who are less happy (Cunningham & Kirkland, 2014), and it is possible that this difference is not entirely innate but is based in part on an acquired sensitization to positive stimuli. More generally, multiple subcortical and brainstem regions, including the amygdala, interact in sensitization to appetitive reward (Correira & Goosens, 2016), which is relevant for some kinds of positive experiences. This possibility of neural sensitization to positive experiences—so that learning from them may occur more efficiently, rapidly, and deeply—is intriguing and hopeful, and calls for further study.

Limitations and future directions

In an exploratory study such as this one, it is reasonable to investigate a wide range of dependent measures, in part to guide future research. Nonetheless, the number of measures raises the question of whether some statistically significant results were achieved by chance

alone. To address the issue of multiple comparisons, four composite indices were created from the original twenty-one measures, repeated measures mixed models were employed to estimate and control for fixed and random effects, and Tukey's post-hoc tests were conducted to estimate pre-post differences.

The majority of study participants were female, white, and middle-aged. The relatively small size and limited diversity of the sample calls for caution in generalizing findings. Future research is needed to determine if larger and more inclusive groups would benefit from increased use of mental engagement factors in general or from the Taking in the Good Course in particular. An active control group (e.g., relaxation training) and classes taught by individuals other than the first author could also add to generalizability and validity. In therapy, coaching, and trainings, it could be valuable to determine whether systematically teaching and encouraging the use of engagement factors could improve outcomes.

Overall, we have found relatively little research on the deliberate use of internal mental factors to heighten social and emotional learning in both structured interventions and everyday life. To take psychotherapy as an example, there has been extensive work on the effects of therapist and client characteristics, and of methods and settings, but little focus on what clients are actually doing inside their minds to increase lasting healing and growth from the experiences they are having. For instance, in a recent review of common factors in psychotherapy (Cuijpers et al., 2019), a summary of 32 factors adapted from Lambert and Ogles (2004) did not include the clients' own conscious efforts to internalize experiences in or related to therapy.

Mental health interventions, including those in positive psychology, generally value beneficial developments in the internal world of the individual, with norms of respect for the autonomy of that person. Consequently, exploring how people can be active agents in their own process of lasting internal change – informed by the growing understanding of positive neuroplasticity – could be full of opportunity.

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Declaration of Interest

The authors declare that they have no conflicts of interest.

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