

Research Article

Changing Lives by Changing Minds: Reducing Cognitive Biases to Enhance Psychological Health

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Abstract

Our central thesis is that integrating multiple evidence-based techniques will offer the best results for optimizing psychological health. We believe that effectively addressing the escalating mental health crisis will require a comprehensive, multi-pronged, approach. Decades of research across the psychological and cognitive sciences have shown that errors in the way people think, called cognitive biases, have a profound impact on many aspects of psychological health. In this manuscript we review several research-based approaches for changing the way people think to improve psychological health. We review evidence on how different cognitive biases—negativity bias, framing bias, confirmation bias, and essentialism bias—impact various aspects of psychological health, and the benefits of mitigating those biases. We also review the important role of social perspective taking in psychological health and how cognitive biases, such as the curse of knowledge bias, the false consensus effect, the spotlight effect, and the fundamental attribution error, interfere with social perspective taking, further highlighting the merits of strategies to minimize these biases. In conclusion, we propose that an integrated, multi-pronged approach is the best way to address the unique and diverse challenges individuals face to maximize the benefits for individuals, and society as a whole.

Keywords: Psychological health, Cognitive bias, Social emotional health, Intervention, Education, Social perspective-taking, Mindset, Theory of mind, Anxiety, Depression, Coping

Introduction

The world is experiencing a mental health crisis! 1 in 8 people worldwide are struggling with their psychological health [1]. In the US, 1 in 5 adults currently have psychological health issues, placing a tremendous \$300 billion burden on the economy in lost productivity and healthcare costs [2,3]. Frighteningly, the situation is getting worse. As just one example, the number of Canadians diagnosed with anxiety and depression has more than doubled in the last 2 decades and ERs have seen a 75% rise in psychological health-related visits, especially among younger individuals [3,4]. To prevent this crisis from escalating, there is an urgent need for more effective approaches to improve psychological health, not only for those currently struggling but also for the general public. *Everyone* can benefit from learning research-based strategies to enhance their psychological well-being. In this manuscript we review research showing that changing the way you think can profoundly improve your psychological health and well-being. Psychological health refers to a person's social, emotional, and mental well-being. It encompasses many facets including emotional regulation, communication, decision-making, relationship satisfaction, as well as the ability to cope with stress and work productively. Psychologically healthy individuals typically manage their emotions effectively, have a positive sense of self, make sound decisions, and maintain healthy relationships with others. Decades of research have shown that errors in the way we think, called cognitive biases, have a profound impact on our psychological

health. Fortunately, the ability to minimize many cognitive biases has been well-documented. Yet, individual research projects tend to focus on one specific bias, one specific debiasing approach, or one aspect of psychological health, with limited communication and integration across disciplines. For example, research on how cognitive biases can be reduced to improve decision-making has primarily been the purview of cognitive and social psychologists or behavioral economists (e.g., [5-8]); whereas, essentialism bias and mindset modification have roots in developmental psychology (e.g., [9,10]) and research on modifying negativity bias is most often studied by clinical psychologists treating depression and anxiety (e.g. [11-15]). In a similar vein, most manuscripts also focus on discussing one type of bias, and its implications for one area of research.

In this manuscript we bring together research from various disciplines to provide a more complete account of how changing the way we think can improve psychological health. First, we review evidence on how different cognitive biases—negativity bias, framing bias, confirmation bias, and essentialism bias—can impact several aspects of psychological health. Next, we review the cognitive biases that interfere with social perspective taking to impact well-being. Throughout our review we highlight the tremendous benefits of mitigating cognitive biases for several facets of psychological health. Our overarching aim is to make the case for integrating multiple evidence-based strategies from different disciplines because we believe that *combining* these strategies is the best way to maximize social-emotional health.

Minimizing Cognitive Biases to Maximize Social-Emotional Health

Cognitive biases are normal by-products of how the mind works, yet vast individual differences in the magnitude of these biases predict myriad aspects of psychological health and quality of life including, but not limited to, decision-making abilities, interpersonal skills, relationship satisfaction, stress management, workplace productivity, academic achievement, self-esteem, and mental illness [10,16-18]. One prominent example of the link between cognitive biases and psychological health comes from clinical research showing evidence that depression, stress, and anxiety are all associated with negativity bias. Negativity bias is the tendency for negative events, information, or emotions to weigh more heavily in our minds than positive ones. For example, if you have ten good experiences and one bad one, you're likely to remember the bad one more vividly and let it affect you more deeply (e.g., [19,20]). The lion's share of research in this area has been conducted by clinical psychologists focusing on two categories of negativity bias; attentional bias and interpretation bias. Attentional bias is characterized by the preferential allocation of cognitive resources (e.g., attention) to negative stimuli. Numerous studies have demonstrated that individuals with depression show a heightened attentional bias toward negative information. For instance, research has shown that depressed individuals are faster to detect and respond to negative stimuli compared to neutral or positive stimuli [15]. This bias is thought to perpetuate and intensify negative mood states by reinforcing the focus on distressing information.

Interpretation bias involves the tendency to interpret ambiguous or neutral information in a negative manner. This type of bias has also been linked to depression. Experimental evidence reveals that individuals with depression are more likely to interpret ambiguous situations negatively compared to non-depressed individuals (e.g., [21]). This bias is also associated with higher levels of stress and anxiety. Research indicates that negativity bias exacerbates anxiety symptoms by skewing the perception of everyday stressors as more threatening than they really are [22]. For instance, a study by MacLeod and Mathews [23] found that individuals with a strong negativity bias are more likely to experience heightened anxiety and stress, as they tend to focus on potential dangers and threats. Importantly, research suggests these biases are not merely *associated* with mood disorders but actively contribute to their development and maintenance (e.g., [13,14,24]). For example, one study found that individuals with a negative attentional bias were more likely to experience longer-lasting depressive symptoms over time [13]. These findings are further supported by prospective studies indicating that even among nonclinical samples, such as university undergraduate students, greater biases predict elevated depressive symptoms months later [25-28]. Critically, training aimed at reducing these biases has been shown to lessen the severity of depressive symptoms from pre- to post-training in individuals with a history of depression [29,30].

Notably, negativity bias does not operate in isolation to affect psychological health. Research shows that other cognitive biases can reinforce or amplify negativity bias and exacerbate pessimistic thinking, stress, and dissatisfaction [31]. Although dozens of cognitive

biases can impact psychological health (e.g., [32-34]), we highlight three more in this section with clear health consequences, namely confirmation bias, framing bias, and essentialism bias. Confirmation bias is the tendency to search for, interpret, and remember information that confirms one's preconceptions [35]. Confirmation bias can work in tandem with negativity bias to exacerbate pessimistic thinking, stress, and dissatisfaction and reinforce negative beliefs. As an example, a study found that individuals who hold negative biases about their partners are more likely to interpret their partners' actions in a negative light, which can erode relationship satisfaction [31]. Similarly, another study found that children with higher levels of worry tended to seek information confirming danger and avoid information disconfirming it, showing how confirmation bias can amplify anxiety by promoting a skewed perception of threats [36].

As a different example of how confirmation bias can impact health, consider how it impacts the diagnostic accuracy of healthcare providers. Research showed that approximately one in eight physicians and one in four medical students exhibited confirmation bias when gathering new information after forming initial diagnoses [37]. This tendency to seek confirmatory evidence not only increased the likelihood of incorrect diagnoses, but also impacted future therapeutic decisions. This example reiterates the point that *everyone* can benefit from learning strategies to minimize cognitive biases. Fortunately, researchers have identified promising interventions to mitigate the effects of many cognitive biases, including confirmation bias. For instance, Morewedge et al. [38] found that a single session of training, involving education about cognitive biases via videos or interactive computer games, significantly reduced confirmation bias (among other biases). These reductions were observed immediately and were still present at least two months later (see also [39,40]).

Another cognitive bias with psychological health implications is framing bias. Framing bias refers to the cognitive tendency to respond differently to the same information depending on how it is presented or "framed". This bias significantly impacts decision-making, risk perception, health behaviours, and consumer choices. Framing bias has been extensively studied in the context of financial decision-making and marketing (e.g., [41,42]). In health contexts, framing bias affects how individuals perceive risks and make health-related decisions. For instance, studies have shown that people are more likely to accept treatment options when the benefits are framed positively (e.g., "90% survival rate") rather than negatively (e.g., "10% mortality rate") [43]. Similarly, framing bias also impacts adherence to medical treatments and health regimens. Research indicates that patients are more likely to comply with medical advice when the benefits of adherence are framed positively. For example, presenting a medication's benefits in terms of enhanced quality of life, rather than in terms of avoiding negative outcomes, has been shown to increase adherence rates [44]. Framing bias also influences decisions related to vaccinations, health screenings, dietary choices, and lifestyle options, as just some examples (e.g., [45,46]). Clearly, the way information is communicated can either hinder or enhance efforts to improve public health.

The effects of framing bias are not limited to decision-making—it also profoundly affects our emotional responses. Individuals are more

likely to experience positive emotions when information is framed positively, and negative emotions when it is framed negatively. This dynamic has significant implications for therapeutic practices as well as preventative approaches. Cognitive Behavioral Therapy (CBT), for example, employs cognitive reframing techniques to help individuals identify and challenge negative thought patterns, replacing them with more constructive perspectives. CBT has been shown to be highly effective in clinical settings (see [Hofmann et al (2012) for a meta-analysis]). Similarly, other research indicates that reframing stressful events in a more positive or controllable light can reduce perceived stress and enhance coping mechanisms (e.g., [47]). The concept of learned optimism [48] also capitalizes on reframing techniques. Learned optimism approaches teach individuals to adopt a more optimistic explanatory style by reframing adversities as opportunities for growth and challenging and reframing pessimistic beliefs. These approaches reduce depression and anxiety while improving emotional regulation and overall well-being (e.g., [49]), underscoring the importance of addressing framing bias to enhance resilience.

Essentialism bias is yet another cognitive bias that impacts well-being in several ways. Essentialism bias refers to the cognitive tendency to view certain categories or groups as having an underlying, unchanging essence that defines their characteristics [9]. This bias can lead individuals to believe that one's attributes are inherent and immutable rather than subject to change [9] and can lead to stereotyping and prejudice towards social groups [50,51]. People also show essentialism bias regarding their own characteristics. In this sense, this bias is closely linked to the concept of a fixed mindset—the belief that human traits, such as intelligence, are innate and unchangeable [10]. A fixed mindset can hinder personal development and resilience because individuals who hold this mindset perceive their traits and abilities as largely unchangeable, reducing their motivation to seek improvement. A growth mindset is the opposite of a fixed mindset and is best described as the belief that one's traits, attributes, or abilities can be shaped through effort [10].

Our mindset permeates nearly every facet of our personal and interpersonal experiences (e.g. [10,52]). For example, studies have shown that possessing a growth mindset enables psychological resilience in the face of negative life events [53]; see also [54,55]. This mindset is also positively correlated with perceived control and self-efficacy in health behavior [56]. In contrast, people with a fixed mindset are more likely to experience anxiety and depression in response to failure [57]. The key to this association may be in the improved coping strategies that individuals with growth mindsets demonstrate [52,58]. Research has shown that individuals who hold a growth mindset are more willing to learn and more likely to seek and adopt coping strategies than those who hold a fixed mindset [52]. In other words, individuals who hold a growth mindset believe that they can adapt to a difficult situation, whereas someone who views their abilities as fixed tends to avoid challenges. Furthermore, individuals who hold a fixed mindset report greater shame and stress in the face of failure and are more likely to blame themselves [52-59]. In contrast, individuals with a growth mindset are shown to be more optimistic, believing that people can change and improve [10]. A 2024 study with middle-school adolescents revealed that higher growth

mindset predicted greater psychological resilience and mediated the relationship between mindset and mental health [60].

Fortunately, a wealth of research has shown that people can be readily taught to be more 'growth-minded'. Recent research on growth mindset interventions highlights the effectiveness of even brief online programs. One such intervention, 'Learning Mindsets' (delivered in 2 online sessions in under an hour) showed significant positive effects on students' mindsets [59]. Similar short interventions were also effective at promoting a growth mindset, even more than some longer in-person approaches, suggesting that concise and accessible formats may be particularly impactful [61]. Importantly, neurocognitive research reveals that adopting a growth mindset can mitigate the negative effects of depression on cognitive abilities [62] and encourage individuals to accept, and utilize, critical feedback [63]. The willingness to adopt positive coping strategies such as acceptance, as opposed to rumination or self-blame, has a strong impact on the social and emotional well-being of individuals facing negative life events. For example, a study examining cancer patients and individual coping strategies found that those practicing adaptive strategies such as modifying uncomfortable situations showed greater resilience and psychological adjustment [64]. Another study showed that breast-cancer patients who used adaptive coping styles reported fewer depressive symptoms [65]. Consistently, cultivating a growth mindset and teaching adolescents to adopt positive coping strategies has also been shown to improve adolescents' mental health [58]. Notably, addressing these biases early in development has the greatest potential to prevent social-emotional problems and yield the most long-term benefits.

Improving Perspective Taking to Maximize Social-Emotional Competence

Social perspective taking, the ability to infer and reason about others' mental states (e.g., their knowledge, beliefs, intentions, desires, thoughts, and emotions; sometimes called 'theory of mind' or mentalizing) is a core component of psychological competence. Perspective taking enables individuals to appreciate diverse viewpoints, empathize with others, and understand the impact of their actions on others (e.g., [66,67]). Research has consistently shown that perspective taking abilities are involved in virtually every social interaction and are critical for effective communication, social decision-making, and maintaining social relationships (e.g., [68-70]). For example, perspective taking is associated with higher levels of empathy, prosocial behavior, and social understanding, which can lead to reduced interpersonal conflicts and increased relationship satisfaction [71]. For instance, studies by Peterson et al. [72] found that perspective taking is associated with increased self-esteem and higher quality friendships. More advanced social perspective taking also appears to act as a protective factor against trauma and adversity (e.g., [73-75]). Conversely, poor perspective taking skills are associated with greater psychological distress [76], more emotional symptoms, and increased loneliness [77]. This latter result is especially noteworthy given longitudinal studies linking loneliness to a variety of negative health outcomes, including poorer sleep quality [78], and increased depressive symptoms [79]. For instance, a meta-analysis

of 18 studies examining the relationship between social perspective taking and Major Depressive Disorder in adults revealed that deficits in perspective taking can be a risk factor for depression and psychosocial impairment, with the level of perspective taking problems predicting symptom severity [80].

Not surprisingly, the way we think about others and their mental states (i.e., perspective taking) is also vulnerable to cognitive biases. Of particular interest in this manuscript is the category of cognitive biases called perspective-taking biases (sometimes called 'egocentric biases or social cognitive biases'). Perspective-taking biases, systematic tendencies or errors in the way we think about others' mental states (or perspectives), can be particularly damaging to interpersonal relationships, impair communication, and lead to poor social decision-making (e.g., [6,81,82]). One perspective taking bias, the curse of knowledge bias, refers to the tendency to be swayed by one's knowledge when reasoning about a more naive perspective (e.g., [7-8,83-87]). A classic example of the curse of knowledge bias (sometimes called 'hindsight bias') is when adults who know the outcome of an event (e.g., a sports game, an election, or a battle) overestimate how likely others are to predict that outcome. In contrast, adults who are unaware of the event's outcome tend to make more accurate estimates of what others will predict (e.g., [88-91]). This bias has been shown to affect judgements and decision making across a wide range of contexts including medicine, education, politics, law, business, and economics (e.g., [6,92-94]; see [91,94] for reviews). In education, for example, teachers with knowledge of the subject matter they are teaching often overestimate how clear their lessons are for students (e.g., [92]). This bias affects communication and social judgments in various ways because it causes individuals to overestimate the likelihood that others share their knowledge. Given the regularity with which we must gauge what others know, this bias frequently leads to miscommunication and misunderstandings in everyday conversations as well as formal communications (e.g., [68,83,95-96]). These communication breakdowns can create conflict and stress and may impact an individual's self-esteem if repeated miscommunications make them question their ability to relate to others. A related perspective taking bias, the false consensus effect, is the tendency for people to overestimate the extent to which others share their beliefs, opinions, and behaviors [97]. In other words, individuals often assume that most people think or behave the same way they do, negatively influencing decision-making, social interactions, and group dynamics. For example, when individuals assume that others share their views, it can lead to disagreements and conflict when they realize their opinions differ. This effect can similarly lead to distorted perceptions of social norms and contribute to problems in group decision-making and impair group cohesion [97-101].

Another perspective taking bias, the spotlight effect, occurs when individuals overestimate the extent to which others notice and evaluate their actions and appearance. This can lead to heightened self-consciousness and increased social anxiety, as individuals mistakenly gauge the level of social scrutiny they will receive. Gilovich et al. [102] demonstrated this in a study where participants consistently overestimated the attention they received—believing that twice as many people would remember the embarrassing T-shirt they wore,

compared to the actual number who remembered. In a follow-up study, participants also overestimated the likelihood their classmates would notice even minor fluctuations in their physical appearance [103]. This effect occurs across many different contexts from volleyball games to video games. Consistently, participants overestimate how much their teammates will notice their performance flaws and expect more critical feedback than they receive [102,103]. This tendency for individuals to feel that they are the center of attention is linked to increased self-consciousness and social anxiety, directly affecting their psychological health. For instance, researchers found that socially anxious individuals were more likely to exhibit the spotlight effect, reporting heightened anxiety and evaluating their performance more harshly when they felt observed by others [32].

Another bias related to perspective taking is the fundamental attribution error (FAE). FAE is a cognitive bias that leads individuals to overestimate how much another person's behavior or circumstance is due to their personal character (i.e., their 'fundamental nature'), rather than considering the influence of external (situational) factors on their actions [104]. In a classic example of FAE, participants listening to a speech believed that the speaker's personal beliefs aligned with their presentation even when they were explicitly told the speaker's position was "decided by a coin toss" [105]. Participants disregarded the situational constraints and tended to assume that the speech was based on personal beliefs and traits [105]. Some researchers suggest that this tendency arises because people find it simpler to attribute a person's actions to their personal characteristics [106,107]. For example, researchers have argued that in the context of people's misfortunes, it is easier to blame an individual for their circumstances, by attributing their misfortunes to their personal characteristics, actions, and choices rather than considering more complex contextual factors [106,107]. This process appears to emphasize personal responsibility and foster victim blaming [108]. Consequently, FAE can contribute to increased judgments of others and reduced compassion [97].

Perhaps not surprisingly, perspective taking offers a powerful countermeasure to the FAE. Perspective taking encourages people to adopt the viewpoint of the other person to consider the situational factors contributing to their actions before blaming the individual. That is, by reasoning about another person's mental states, individuals can better understand their point of view and acknowledge the situational constraints that affect their actions and decisions. Thus, perspective taking may lead to a reduced sense that the other person is accountable, especially towards victims of circumstance, such as those trapped in a systemic cycle of poverty. For example, Hooper et al. [104] demonstrated that a brief perspective-taking exercise focusing on shifting perspectives significantly reduced the FAE. Participants who completed the exercise were better able to attribute behaviors to situational factors rather than dispositional traits (see also [109]). In other words, perspective taking seems to shift the blame from individuals to broader situational factors, fostering a more empathetic view of behavior. Following a similar logic, researchers should be able to reduce the FAE, and other perspective taking biases, through a range of activities that enhance perspective-taking (e.g., [110-112]).

To date there are several promising methods for enhancing perspective-taking. Research in this area has taken one of two general approaches. One general approach involves highlighting the different kinds of thoughts, emotions, and opinions people have in different contexts, depending on their unique experiences, backgrounds, and predispositions. There are several different types of techniques used in this area of research; collectively we call this type of approach the 'Alternate Views' approach. This general approach can be conducted passively (e.g., by exposing individuals to scenarios, real or hypothetical, with a range of different viewpoints) or actively (e.g., asking individuals to engage in real or imagined role-taking exercises, or reflect on their own thoughts and actions in different contexts and how those actions might be perceived by others (e.g., [113-115]). For example, Rezaei et al. [109] found that medical students who engaged in these reflective practices (e.g., via journaling), improved their empathy and ability to adopt patients' perspectives. Other work has examined the efficacy of using acting lessons to foster perspective taking [116]. A wealth of other research has highlighted how increasing mental state discourse (i.e., simply talking more about mental states and differing points of view) can improve perspective taking abilities (for a review see [117]).

A second general approach that has been used to improve perspective taking is the Cognitive Debiasing approach which directly targets the biases that can impede perspective-taking. This approach involves educating individuals about common cognitive biases and strategies for minimizing them (e.g., [82]). Notably, cognitive debiasing methods are not specific to enhancing perspective taking but are commonly used to reduce cognitive biases to improve decision-making across a range of contexts (e.g., [38-39,102,118,119]). Given the many benefits of enhancing perspective-taking, we believe that approaches for enhancing psychological health should incorporate strategies for improving perspective taking as often as possible. In our opinion, the most effective interventions to foster psychological health will capitalize on the benefits of the Alternate Views approach *and* the Cognitive Debiasing approach. That is, we believe optimal results can be achieved by integrating the alternate views approach with education about cognitive biases and strategies for minimizing them.

Closing Remarks

Effectively addressing the mental health crisis will require a comprehensive, multi-pronged, approach. While piecemeal approaches provide valuable insights into the individual factors that influence well-being, overcoming the mental health crisis will require multiple evidence-based strategies. Individuals experience psychological health problems for a myriad of reasons (e.g., [120]). The kind of treatment or strategy that works for one person may not work for everyone. Combining strategies is the best way to address the unique and diverse challenges individuals face to maximize the benefits for individuals and society.

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