IN PRESS at *Psychological Review*

Open-Mindedness: An Integrative Review of Interventions

Stephanie Y. Dolbier*, Macrina C. Dieffenbach*, and Matthew D. Lieberman

Department of Psychology, University of California, Los Angeles

Author Note

*These authors contributed equally to this manuscript
We have no known conflicts of interest to disclose. Correspondence regarding this article may be addressed to Matthew D. Lieberman (lieber@ucla.edu)

Abstract

Partisan animosity has been growing in the U.S. and around the world over the past few decades, fueling efforts by researchers and practitioners to help heal the divide. Many studies have been conducted to test interventions that aim to promote open-mindedness; however, these studies have been conducted in disparate literatures that do not always use the same terminology. In this review, we integrate research on open-mindedness in order to facilitate cross-talk and collaboration between disciplines. We review various concepts related to open-mindedness and then offer a conceptual model to help guide the further development of interventions and research to understand open-mindedness. We propose that open-mindedness is multi-faceted and dynamic, such that interventions should focus on targeting multiple psychological pathways in order to maximize and sustain their effects. Specifically, we propose that interventions that target cognitive and/or motivational pathways can induce open-mindedness initially. Then, training in emotion regulation and/or social skills can help to sustain and build on open-mindedness once individuals enter into a situation where their beliefs are challenged. We conclude with a discussion of potential future directions for research on open-mindedness interventions.

Keywords: Open-minded; openness; open-mindedness interventions; receptiveness; intellectual humility; latitude of acceptance; naïve realism

"Philosophy should be piecemeal and provisional like science; final truth belongs to heaven, not to this world." - Bertrand Russell, 1927

When someone disagrees with us, it is easy to conclude that the other person is crazy, stupid, or biased. We assume that if the person were sane, intelligent, and clear-headed, they would share our perspective. When we adopt this mindset, we are being so-called 'naïve realists' — assuming that we have access to 'objective truth' and that anyone who disagrees with us needs to adjust their way of thinking (Ross & Ward, 1996). We typically feel that we can 'see' reality whether we are making sense of the physical world, another person's true intentions, or a story heard on the radio, and we have a great deal of trust in anything that feels like seeing even if it is not strictly visual (Lieberman, 2022). As naïve realists, we often struggle to learn from new perspectives or reach mutual understanding with those who disagree with us. In other words, we fail to be *open-minded.* In response to these challenges, many scholars have developed interventions to increase open-mindedness; however, little work has been done to systematically consider these interventions. In this review, we synthesize empirical work from multiple disciplines that have aimed to engage different aspects of open-mindedness, often using their own distinctive terminologies. To provide a framework for the review, we present a conceptual model of the primary pathways that are targeted by open-mindedness interventions, focusing separately on interventions that prepare people to be open-minded and interventions that help people maintain an open-minded frame of mind during ongoing interactions. Furthermore, we report on the strength of the evidence to support different intervention types and suggest goals for future research.

Motivation for The Present Review

Previous work aiming to increase open-mindedness has been conducted across multiple fields, including social psychology, moral psychology, political psychology, positive psychology, conflict resolution/peace-making, education, political science, sociology, philosophy of education, communication studies, virtue epistemology, negotiation, and organizational behavior, among

others. Many practitioners and bridge-building coalitions have also attempted to open minds in more applied settings. For instance, as of March 2022, more than 6,700 groups were cataloged in the Princeton University's Bridging Divides Initiative's database, which does not even include groups that operate outside of the United States (Bridging Map, 2021). However, cross-talk among these disparate academic fields and practitioners has been limited, which has resulted in a range of terms that have been used to describe open-mindedness, as well as a vast array of intervention approaches that have rarely been integrated.

Scholars who view open-mindedness through a lens of virtue and/or epistemological development, such as moral psychologists, philosophers, and educators, tend to emphasize how being open-minded cultivates individual learning and creativity (Baehr, 2011). Indeed, educators at many top institutions propose that a traditional liberal arts education is meant to produce open-minded individuals that can better work towards solving society's problems (Project on Liberal Education and the Sciences, 1990). On the other hand, social psychologists, political scientists, conflict resolution scholars, sociologists, and organizational behavior experts tend to focus more on the interpersonal and group-level consequences of being closed-minded. For example, the United States has seen a sharp increase in 'affective polarization,' or reported antipathy between its two political parties over the past decade (Iyengar et al., 2019). Liberals and conservatives think that people on the other side are closed-minded and do not share their values and goals (Pew Research Center, 2019). Moreover, liberals and conservatives have segregated themselves physically by moving to different neighborhoods (Bishop, 2008) and also virtually, by moving into social media 'echo chambers' (Cinelli et al., 2021). The results of this ideological sorting could be seen during the 2020 presidential election, where 40% of Americans reported not knowing a single person who voted for the 'other' candidate (Pew Research Center, 2020). Therefore, when partisans fail to be open-minded toward one another, they can engage in behaviors that can reshape social structures, which can serve to further reinforce their closed-mindedness.

With this review, we hope to encourage further inter-disciplinary dialogue and collaboration among researchers and practitioners who aim to develop integrative, high-impact interventions to promote open-mindedness. We selected the format of a narrative review rather than a meta-analysis because the studies included are highly methodologically diverse, examining different outcomes and employing different interventions that target distinct mechanisms (Baumeister & Leary, 1997). Although we examined the quality of the evidence for the different interventions, highlighting when the evidence was strong, mixed, or tentative, we did not directly compare the interventions' effect sizes due to the methodological diversity of the included literature and the broad array of constructs they measure. Instead, we highlight important details and qualifications that may affect how the reader interprets the results of the reviewed studies and the evidence behind different open-mindedness interventions. More comprehensive details on the reviewed studies are included in the Supplemental Materials Table S1. In the future, it may be beneficial for scholars to agree on a shared terminology when discussing open-mindedness and related interventions, which would facilitate better information exchange across academic disciplines. Furthermore, it would be useful for scholars to align on more standardized measures and intervention protocols allowing various interventions to be tested on the same outcome variables. This would make it possible to perform similar, more precisely targeted reviews and meta-analyses in the future to determine which open-mindedness interventions have the strongest effects. We hope that this manuscript will serve as a valuable resource for researchers seeking to become aware of strategies used in other areas, as well as one to help them ground their research within a common framework of open-mindedness.

Open-mindedness and Related Constructs

When an ordinary person emphasizes the need for more open-mindedness in the world, they might mean one of a myriad of things. Perhaps they wish for people to be more willing to listen to new perspectives, to fully hear out someone's position before casting judgment, or for them to

scrutinize their own beliefs more readily. Additionally, they could mean to encourage greater empathy, understanding, and respect towards those they disagree with. These goals all underscore the richness of the term as it is used colloquially. However, it is less clear how this broadly-defined construct fits into a holistic understanding of the psychological literature and related concepts such as attitude change, intellectual humility, openness to experience, wisdom, and empathy. We will first outline these related concepts, discussing where they overlap with and where they are distinct from the core concept of open-mindedness.

Naïve Realism

When psychologists lament the lack of open-mindedness in the world, they often point to the fact that humans tend to be naïve realists, often confusing our subjective construals of the world for objective reality. Ross and Ward (1996) characterize naïve realism as having three core tenets. First, we believe our perception of the world is objective and unbiased. Second, we believe that other people see the world the same way as us if they are informed and have put thought into their opinions. Finally, we believe that anyone who disagrees with us must be uninformed, irrational, or biased. Understandably, our natural tendency to engage in naïve realism is not conducive for open-minded thought. The extent to which someone is a naïve realist is one of many factors impacting how open-minded they are. Indeed, some interventions meant to improve open-mindedness propose to teach people about this cognitive bias in the hopes they can rise above it (Nasie et al. 2014).

Prejudice, Discrimination, and Attitude Change

Although open-mindedness is strongly associated with one's attitudes towards people and ideas one disagrees with, seeking to change these attitudes is not the same as seeking to improve open-mindedness. Typically, interventions focused on prejudice and discrimination strive to improve attitudes and behaviors towards specific people or groups (for a thorough review of these interventions, see Paluck et al. 2020). In contrast, interventions to improve open-mindedness focus

more on encouraging a *willingness* to non-defensively entertain alternative ideas that others hold. Being open-minded does not necessarily involve changing one's position or attitude on a topic, but rather might involve expanding one's 'latitude of acceptance', or the range of attitudes that they find to be acceptable for other people to hold on an issue (Dieffenbach & Lieberman, 2023; Sherif & Hovland, 1961). This has interesting implications for researchers - while partisans may be resistant to explicit attempts to shift their attitudes or persuade them on a topic, they may be more amenable to simply hearing out other positions if it is not accompanied with an expectation to budge from their entrenched position at all. Indeed, the idea that increasing someone's open-mindedness can lead to easier attitude change down the road is a common motivation for implementing open-mindedness interventions. However, despite their close relationship, open-mindedness seems best described as a precursor or predictor of attitude change, rather than one and the same.

Empathy

There is also some conceptual overlap between open-mindedness and empathy interventions. Empathy can be defined as "the ability of one person (a perceiver) to share and understand the internal states of someone else (a target)" (Weisz & Cikara, 2021). Many definitions posit that empathy has affective, cognitive, and motivational components (Weisz & Cikara, 2021). However, many empathy intervention studies do not separate these three components from one another. Of these components, 'cognitive empathy' (or 'perspective-taking'), which is regarded as being able to intellectually understand what others feel and think, comes closest to open-mindedness. However, understanding another person's point of view is different from believing that the person's view may be reasonable and worthy of consideration, or even being willing to hear that person's perspective, which is more central to being open-minded. That is to say, while perspective-taking might involve trying to understand what someone else is feeling and thinking, open-mindedness refers more to the *willingness*, rather than the ability or attempt, to do so. Furthermore, the wide-ranging empathy literature has historically focused more on people's ability to share and

understand what others *feel* rather than what they *think*, which is more core to open-mindedness. For a review of empathy interventions, see Weisz and Zaki (2018). Additionally, while cognitive empathy is limited specifically to understanding other people's perspectives (i.e. "what is going on in the mind of this person who disagrees with me?"), open-mindedness can be applied more broadly to any ideas under consideration (e.g. "what would the world look like if what I believe is actually wrong?"). Nonetheless, open-mindedness and cognitive empathy are tightly linked, and indeed, one possible mechanism to increase open-mindedness may be to encourage people to take another's perspective. It also seems plausible that more open-minded people may naturally engage in more perspective-taking. We will discuss these possibilities in more detail when we consider cognitive pathways to open-mindedness.

Openness to Experience

Another concept commonly associated with open-mindedness is 'openness to experience' (sometimes abbreviated as 'openness'), which is one of the factors included in the Five-Factor Model of personality (McCrae & Costa, 1987) and the Big Five Inventory (John et al., 1991). Traditionally, openness to experience has been characterized by two main components, an "experiencing" component that focuses on people's tendency to appreciate aesthetics and sensations, and an "intellect" component that focuses on a curiosity for abstract and semantic information (DeYoung et al., 2012). Under this conceptualization, openness has more of a focus on people's tendency to pursue novel experiences rather than people's openness to alternative ideas, as would better characterize open-mindedness. However, more recent network analyses of commonly used openness inventories have identified a third component called "open-mindedness" that captures aspects more related to what we have been describing as open-mindedness, such as receptiveness to new ideas and embracing a variety of attitudes (Chistensen et al. 2019). This conceptualization of openness suggests that an individual high in openness will also likely be high in open-mindedness. However, it is important to note that depending on the index used to measure openness, this "open-

mindedness" aspect is not always captured. Some commonly used measures only covered the "experiencing" and "intellect" aspects, meaning that while some conceptualizations of openness may include the concept of open-mindedness under its umbrella, this is not guaranteed. Additionally, it may be that what is colloquially understood as "open-mindedness" is a compound aspect of personality, not solely being captured by openness to experience, but also relating to other traits like agreeableness (Christensen et al., 2019). Researchers should use caution when interpreting openness to experience measures and their relationship with open-mindedness.

One possible point of confusion is that newer versions of the Big Five Inventory have renamed *openness to experience* to *open-mindedness* in order to emphasize its focus on an individual's openness to mental experiences rather than social experiences (Soto & John, 2017). However, as with older conceptualizations of openness to experience, this newer conceptualization still captures a broader network of ideas including intellectual curiosity, aesthetic sensitivity, and creative imagination, not all of which are relevant for our definition of "open-mindedness". While this personality factor may encompass some aspects of someone's willingness to engage with alternative ideas or hear new perspectives, it does not specifically map onto these concepts. Therefore, it is important to note the distinction between the personality trait of "Open-mindedness/Openness to Experience" and the more colloquially understood concept of "open-mindedness" that is the subject of this review.

Another difference between openness to experience and "open-mindedness" is that openness to experience, along with the other Big Five personality traits, is considered to be relatively stable, and few studies have been able to use interventions to shift it (cf. Stieger et al. 2020). On the other hand, many of the open-mindedness interventions discussed in this review have found success in increasing people's willingness to engage with dissenting opinions, suggesting that a person's open-mindedness may be influenced by situational and contextual factors. One implication of this might be that an individual's trait openness may act as a moderator for the effectiveness of

attempted open-mindedness interventions, influencing 'baseline' open-mindedness which can then fluctuate up or down depending on the situation.

Need for Closure

Research on another similar construct, need for closure (NFC), outlines the importance of situational factors and how they might also apply to open-mindedness. Closely related to both openness to experience and open-mindedness, NFC is defined as the 'desire for a definite answer to a question, as opposed to uncertainty, confusion, or ambiguity' (Kruglanski & Fishman, 2009). An individual with high NFC dislikes ambiguity, leading them to be more likely to form premature judgments, be resistant to new information once their mind is made, and prefer uncomplicated answers. Unsurprisingly, NFC is anticorrelated with both openness and open-mindedness (Kruglanski & Webster, 1996); however, whereas the concept of NFC focuses on someone's comfort with ambiguity, the core of open-mindedness is about someone's receptivity to different viewpoints. Notably, the theory behind NFC demonstrates that while individual differences are observed in "baseline" or "trait" levels of NFC, the degree of NFC someone exhibits also depends on situational factors (also called "state" levels of NFC). Kruglanski & Fishman (2009) note that people's NFC can rise dramatically in the context of time pressure, when the individual is under stress, or when there is social pressure to make up one's mind, among other examples. Open-mindedness is also best characterized by having both trait- and state-like characteristics. Individual differences in open-mindedness clearly exist, but context can drastically change how willing someone is to have their beliefs challenged. For instance, someone being interrogated in a debate-like setting may find it much more difficult to hear opposing ideas out than someone who feels safe and secure in their mindset. Additionally, while NFC and open-mindedness explore opposite ends of a common spectrum, this does not mean they are interchangeable. For example, while time pressure increases NFC, giving more extended time to answer will not, in itself, increase the open-mindedness of partisans. We will explore these ideas in more detail throughout this review.

Intellectual Humility

The concepts of open-mindedness and intellectual humility are perhaps the most similar of the constructs under consideration, but also have important differences. Philosophers identify intellectual humility as an important intellectual virtue consisting of the ability to recognize one's own fallibility as a knower (Spiegel, 2012). The psychological construct of intellectual humility is defined similarly, being the "ability to recognize shortcomings or potential limitations in one's own point of view" (Porter et al. 2022). On the other hand, open-mindedness focuses on one's willingness to consider other views, regardless of one's own beliefs. That is, while intellectual humility is a sort of meta-attitude about *one's own* beliefs, open-mindedness is the attitude one takes towards *others'* beliefs and whether they are worthy of consideration. For a more comprehensive review of the history of intellectual humility and the factors that make up it, see Porter et al. (2022). It is important to note that intellectual humility and open-mindedness show strong empirical associations when measured together, with one study reporting that people with more intellectual humility were also more open to learning about the opposing view ($r = 0.48$, Porter & Schumann, 2018). Keeping this in mind, it is likely that targeting people's attitudes on intellectual humility will also show effects on open-mindedness, and vice versa. We discuss this further when we discuss cognitive pathways to open-mindedness. Here it is important to note that while intellectual humility is undoubtedly a precursor to open-mindedness (i.e. recognizing the limits of one's own point of view would lead one to consider alternative points of view), it is not the only one. For instance, empathy may also induce open-mindedness without a corresponding change in intellectual humility.

Wisdom Research

Finally, it is important to distinguish open-mindedness research from the broader field of wisdom science. Much like the broadly-used colloquial definition of open-mindedness, "wisdom" is an elusive phenomenon that appeals strongly to intuition, but is nonetheless difficult to pin down

with a single definition. One common conceptualization of wisdom might be that of respected elders using their decades of life experience and insights to lead and guide the younger generations. Recently, a task force of psychological researchers came together to create a common wisdom model, identifying key aspects of wisdom to be a set of morally grounded goals (e.g. pursuit of truth, shared humanity) based in types of social-cognitive processing (e.g. metacognition) (Grossmann et al. 2020). The meta-cognitive aspect of wisdom is deeply tied to concepts such as intellectual humility and open-mindedness, in fact, calls for greater wisdom accompany those for greater open-mindedness in response to an increasingly hostile political climate. However, the construct of wisdom extends beyond this, applying to many aspects of life and problem-solving beyond simple ideological beliefs and attitudes. One might say that it is possible to be open-minded without being wise but that true wisdom requires having a certain level of open-mindedness. Open-mindedness may simply be one of many dimensions that factor into a complete model of wisdom, in addition to concepts like intellectual humility, emotion, and morality. Additionally, wisdom research puts an explicit focus on situational factors - rather than being a stable personality trait, the level of wisdom someone displays depends on the context, and a key aspect of being 'wise' is knowing when to apply various meta-cognitive mindsets (Grossmann et al. 2016). A full overview of the wisdom construct is beyond the scope of the current discussion, but Grossmann et al. (2020) do an excellent job discussing the historical background of wisdom research and laying a foundation for future work in this field.

Implications for the Current Review

Throughout our discussion of these related constructs, a common theme is apparent. While each has distinct conceptual differences from open-mindedness, they are correlated such that interventions targeting open-mindedness may also serve to shift the others or may even specifically rely on manipulating a related construct. One way to conceptualize this might be to consider "open-mindedness" to be at the center of a large Venn diagram, with related concepts such as intellectual

humility, openness, etc. intersecting the open-mindedness circle partially, but not completely. One strategy for an open-mindedness review might be to focus only on the things that make open-mindedness distinct from the other constructs. However, we believe this narrow perspective is not likely to prove useful for developing effective interventions to improve open-mindedness in reality. In order to properly take into account the many factors influencing how someone responds to situations requiring open-mindedness, we opt for a broad perspective in this review, examining the entirety of open-mindedness and its intersections with related concepts. In the next section, we present a definition of open-mindedness that represents its core distinguishing features. We then build a conceptual model for open-mindedness interventions drawing upon a broader and messier conceptualization of open-mindedness, outlining related constructs as appropriate.

Open-Mindedness: Definition and Conceptual Model for Interventions

For the purpose of this review, we formally define *open-mindedness* as "an individual's willingness and ability to consider alternative viewpoints." Most definitions of open-mindedness have been developed by philosophers who perceive it to be an 'intellectual virtue.'[1] Our core conceptualization of open-mindedness is a simplified version of an idea from the virtue epistemologist John Baehr (2011), who defines an open-minded person as being "characteristically (a) willing, and (within limits) able (b) to transcend a default cognitive standpoint (c) in order to take up or take seriously the merits of (d) a distinct cognitive standpoint." Our definition attempts to retain these ideas while also simplifying them so that they are accessible for scientists and practitioners alike. Baehr's definition closely aligns with the philosopher Bertrand Russell's ideal of 'critical receptiveness,' which encourages welcoming new ideas while also being appropriately skeptical of them (Russell, 1928; see Hare, 2001, 2009). Psychologist John Lambie (2014) refers to this idea as 'critical open-mindedness,' distinguishing it from what he calls 'anything goes open-

[1] Recently, open-mindedness has been classified by philosophers under the umbrella of 'wise reasoning.' For a recent review of wisdom science, which contains definitions of constructs and related scales, see Grossmann et al. (2020).

mindedness' to address concerns by critics that open-mindedness gives equal weight to all opinions, including evil ones (p. 16). The idea of critical open-mindedness is also similar to 'moral pluralism,' which posits that there may be multiple acceptable moral viewpoints, but also that there can be some views that are unacceptable (Graham et al., 2013).[2] Thus, people can be open-minded without giving a platform to hateful rhetoric, becoming brainwashed by misinformation or conspiracy theories, or even changing their minds.

Having provided a core definition of open-mindedness, we will dive deeper into the multiple, interdependent factors that contribute to having an open mind. It is most appropriate to conceive of open-mindedness as having both trait-like and state-like qualities. People have a baseline, trait level of open-mindedness at any point in time that generalizes across different situations. This baseline open-mindedness is partially due to individual differences in personality, but it may also be influenced by past experiences and attitudes. When we think of how open-minded someone is in general, we are thinking about trait open-mindedness. However, a deeper understanding of open-mindedness also requires acknowledging its state-like characteristics, that is, its propensity to be influenced by situational factors. Much like someone might be in a more or less excited 'state' depending on the circumstances surrounding them at that moment, the degree of open-mindedness someone displays is also dependent upon context. For instance, while someone might be largely open-minded in general (i.e. having a high trait open-mindedness), they might have specific issues they consider too sacred to even discuss, leading them to be close-minded in specific situations where those issues arise (i.e. an instance of a low state open-mindedness). Another way one might visualize this is to think of people's open-mindedness as a density distribution of state-specific

[2] Graham et al. share a helpful quote from philosopher Isaiah Berlin that helps distinguish 'moral pluralism' from 'moral relativism': "If I am a man or a woman with sufficient imagination (and this I do need), I can enter into a value system which is not my own, but which is nevertheless something I can conceive of men pursuing while remaining human, while remaining creatures with whom I can communicate, with whom I have some common values—for all human beings must have some common values or they cease to be human, and also some different values else they cease to differ, as in fact they do. That is why pluralism is not relativism—the multiple values are objective, part of the essence of humanity rather than arbitrary creations of men's subjective fancies." (Berlin, 2000)

manifestations (Fleeson & Jayawickreme, 2015). The mean of such a distribution represents the average or trait open-mindedness, while the shape and spread of the distribution represents the wide variation of states that someone's open-mindedness might take (Jayawickreme et al., 2019). Someone with a wide density distribution might be particularly susceptible to situational context, changing how open-minded they are drastically depending on the context they are in. In contrast, someone with a narrow distribution might more consistently apply stable levels of open-mindedness regardless of the topic at hand.

With this in mind, open-mindedness is best thought of as a dynamic state. We all start out with a baseline level of open-mindedness, but that level constantly changes and updates based on the situational factors at play. For instance, imagine that you enter into a conversation with your 'crazy Aunt Mildred' with an open mind, determined to engage with her ideas critically however misguided they may be. However, as soon as she starts 'spouting nonsense,' your blood starts to boil, you go on the defense, and lash out at her. Although you began the conversation with an open mind (i.e. a willingness to consider her views), your mind closes up again once you are in a social situation that triggers automatic emotional and behavioral responses. Importantly, someone's level of open-mindedness does not necessarily stay the same throughout an interaction, it is constantly updating up and down as new context unfolds. Because open-mindedness exists as this dynamic process, we might best think of it as a sort of *candle in the wind*. Once an open mind is 'lit,' outside forces can either shield it or snuff it out. Similarly, since individuals' thoughts and behaviors occur within the context of a larger environment, their ability to be open-minded depends on their own internal processes as well as external factors from the environment.

Many of the interventions covered in this review act on the level of a single individual or interaction. These interventions attempt to change things such as someone's mindset approaching an interaction, the context of that interaction, or the skills they have to navigate and stay open-minded throughout an interaction. However, it is essential to recognize the effect that broader societal-wide factors such as social norms (a group's shared understanding of what behavior is

appropriate in a given context) and social structures (the way that people and institutions within a society are organized) have on open-mindedness as well. One example of this is the issue of same-sex marriage. Until 2005, same-sex marriage was a divisive issue in the United States, with the majority of Americans opposing it. However, by 2015, the majority of Americans supported it, and it was legalized in all 50 states (Pew Research Center, 2015). In turn, research has shown that this legalization led to changes in people's perceptions of social norms (Tankard & Paluck, 2017) and further increases in individuals' open-mindedness toward same-sex marriage (Ofosu et al., 2019). Living in a society that values open-mindedness towards different ideas may, in fact, be a sort of open-mindedness "intervention" in and of itself. This is especially clear when considering the value our society places on receiving a liberal arts education (also called a 'liberal education'). Traditionally, a liberal education is meant to create open-minded individuals who are free from dogma, conscious of their judgments, and aware of their place in the natural and social world (Project on Liberal Education and the Sciences, 1990). It seeks to accomplish this through exposing students to a broad array of ideas and disciplines, while also emphasizing critical thinking, problem-solving, and healthy debate. Indeed, receiving a liberal education does seem to successfully improve facets of open-mindedness, making people more intellectually curious, more open to diversity and challenge, and giving them a greater need for cognition (Seifart et al. 2007). A full model of open-mindedness and interventions for improving it should acknowledge the larger social framework that it exists within. While these factors are less malleable in the context of an intervention in the lab, they no doubt influence the way individuals engage with situations requiring open-mindedness. Furthermore, just as society and culture influence individuals' behavior, individuals, in turn, shape the society in which they live. Therefore, open-mindedness interventions at the level of the individual may still have some implications for societal change. We will speculate further on potential larger scope, societal-wide interventions in the discussion section of this review.

Traditionally, many open-mindedness interventions have focused on targeting individual mechanisms in isolation, which has been important for developing a thorough understanding of the

underlying psychology of open-mindedness. However, creating interventions that can have maximal real-world impact may require a more holistic, integrated approach that considers all the individual, situational, and broader cultural and structural factors that influence one another. For this reason, this review presents a conceptual model for open-mindedness interventions that acknowledges the dynamic and multi-faceted nature an individual's open-mindedness takes.

Specifically, the model proposes that we can first develop the ability to be more open-minded through interventions that target (1) cognitive and (2) motivational processes at the individual level. These interventions typically act *prior* to an interaction that requires open-minded thinking, helping us to engage in less biased thinking, become more aware of our thought processes, and be motivated to entertain alternative ideas. However, we also benefit from training in (3) affective and (4) behavioral/social skills so that when we enter into a situation where our beliefs are challenged, we can use these skills to maintain and continue to build upon an open-minded stance *during* that interaction. These interventions help us regulate our emotions and engage in constructive behaviors that can facilitate transformative experiences. We believe that psychological interventions should target these different levels, or some combination of them, to promote and sustain open-mindedness across different situations. Finally, the model recognizes that open-mindedness is situated within a larger societal and structural context that also influences the extent to which individuals are willing and able to engage in open-minded thinking and behavior (see Figure 1).

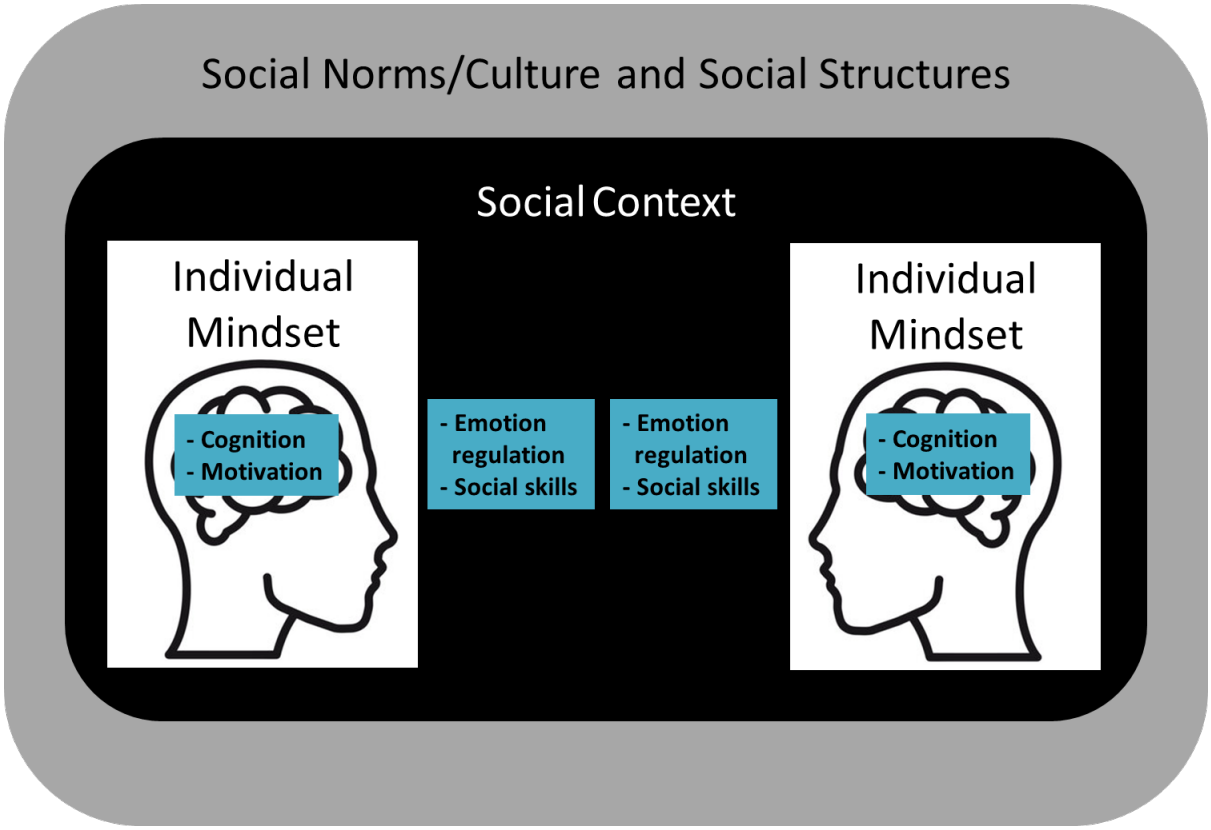

Figure 1. A conceptual model of the components that contribute to promoting and sustaining open-mindedness. Interventions can promote open-mindedness at the individual level through cognitive and motivational pathways. Interventions can also teach emotion regulation and social skills that can help to sustain and build on open-minded thinking in social contexts. Furthermore, interventions can target social norms/culture and social structures, which influence the extent to which individuals are willing and able to engage in open-minded thinking and behavior.

The remainder of this review will focus on open-mindedness interventions that target one of these four pathways: cognitive, motivational, affective, and social (see Table 1). As suggested by our conceptual model, these four pathways are interconnected, such that intervening on one mechanism can have downstream effects on others. For this reason, we have categorized interventions based on the primary outcomes that they target and measure, although some interventions could arguably be placed into multiple categories. Some of the discussed interventions target open-mindedness directly, while others target related constructs or underlying mechanisms. By highlighting interventions in each category, we hope to provide a roadmap that future researchers and practitioners can use to create integrated interventions that both induce and sustain open-mindedness in the long-term.

Before jumping into the details of existing open-mindedness interventions and their associated pathways, it is essential to clarify the variety of outcome variables included as evidence for successful open-mindedness interventions in the studies below. Open-mindedness is most often measured by looking at changes in attitudes or behavior towards the outgroup, as well as increases in one's willingness to engage, empathize, or compromise with dissenting opinions. However, as discussed earlier, open-mindedness is closely associated with many related constructs, and many studies that do not directly look at open-mindedness are nonetheless essential for a holistic understanding of the field. As such, this review will discuss studies showing evidence of attitude change, decreases in confidence about one's own beliefs, and other conceptually distinct measures. Although these measures are not directly measuring the core open-mindedness construct, they are nonetheless highly relevant, as changes in one are often accompanied by changes in the other. Our aim is to provide a comprehensive overview of all possible interventions that might be used to increase open-mindedness, even if this was not a direct objective of the original study containing the intervention. Thus, in the studies reviewed below, we strive to acknowledge results conceptually relevant or adjacent to open-mindedness, in addition to more core measurements of open-mindedness. Additionally, we include a more in-depth discussion of various measures that have been used to investigate open-mindedness in the Supplemental Materials (Supplemental Table S2).

Finally, it is important to acknowledge that some of the studies included in this review are likely underpowered and thus should be interpreted with caution. As this review is intended to be a comprehensive overview of *any* work that might have applications for improving open-mindedness, we have chosen to err on the side of inclusion in the hopes that even underexplored areas of research might inspire new ideas or encourage researchers to try new approaches for developing open-mindedness interventions. Many older studies, especially those with sample sizes under 100, would not meet the standards for today's statistical best practices and are in need of replication. As such, some of the reviewed areas may be underexplored and future work must be done to determine whether the reported effects are truly robust. Throughout the review, we will make

efforts to distinguish between areas of research that are supported by robust bodies of work and areas that should be seen as more speculative and in need of follow-up work. Additionally, notes on each individual study's robustness and overall evidence are included in the Supplemental Materials (Supplemental Table S1), and overviews of each intervention type are provided in the discussion section (Table 3). Our hope is for this review to provide a comprehensive and holistic overview of techniques for researchers interested in open-mindedness interventions, ranging from domains with an abundance of evidence to underexplored areas that may inspire new approaches.

Table 1. Four pathways for open-mindedness interventions

Pathway	**Brief definition**	**Timing**	**Examples**
Cognitive	Interventions that target patterns of thought in individuals, such as reducing biases in their thinking, and promoting more flexible and complex mindsets	Can help people ***become*** open-minded prior to an interaction or ***before*** consuming challenging information	Teaching about biases, Perspective-Taking, Psychedelics
Motivational	Interventions that target or emphasize desires that individuals have to be accurate, have self-integrity, and feel a sense of belonging	Can help people ***become*** open-minded prior to an interaction or ***before*** consuming challenging information	Promoting Accuracy Motives, Self-Affirmation, Leveraging the Need to Belong
Affective	Interventions that focus on helping individuals regulate their emotions	Helps individuals maintain composure ***during*** an interaction and ***remain*** open-minded in the face of challenging beliefs	Cognitive Reappraisal, Encouraging Emodiversity
Social	Interventions that focus on improving social interactions and individuals' communication skills	Helps individuals maintain composure ***during*** an interaction and ***remain*** open-minded in the face of challenging beliefs	Building Rapport, Perspective-getting and giving, Framing Opinions with Receptive Language

Note. The four main pathways that open-mindedness interventions can target are listed alongside a brief definition, an explanation of when this type of intervention is best applied to maximize efficacy, and examples. Interventions targeting cognitive and motivational pathways are generally most

effective when administered prior to an interaction requiring open-mindedness, while those targeting affective and social pathways help individuals remain open-minded during such interactions.

Inducing Open-Mindedness Through Cognitive Pathways

The majority of open-mindedness interventions target cognitive pathways. In particular, these interventions aim to reduce biased thinking and/or promote a more 'expansive' mindset. Some interventions take a targeted and direct approach by teaching individuals about cognitive biases and giving them strategies to avoid biased thinking. Another targeted approach involves teaching people to embrace certain beliefs, or implicit theories, that lead them to engage in more open-minded thinking and behavior. Yet another targeted, more socio-cognitive, approach involves training people to take the perspectives of others.

Alternatively, some interventions are less targeted, influencing more domain-general cognitive mechanisms. For instance, many interventions aim to broaden and/or complexify people's thinking through priming. Other interventions use cognitive training that operates on low-level cognitive processes underlying open-ended thinking, such as meta-cognitive awareness. There is even a pharmacological approach suggesting that psychedelic therapy may allow people to transition more easily between different mental states and beliefs. We will begin by reviewing the more direct and targeted cognitive approaches, followed by the more domain-general approaches.

Targeted Cognitive Approaches

Teaching About Biases. One targeted approach for increasing open-mindedness through a cognitive pathway involves teaching individuals about the existence of biased thinking and then training them on how to engage in alternative thought processes. Over the past decades, researchers have documented several cognitive biases that reliably alter human judgment and decision-making (Nisbett & Ross, 1980; Tversky & Kahneman, 1974; Vallone et al., 1985). Research on correcting biases in social judgment shows that participants must learn about the bias, identify how the bias has affected their own judgments, and then be motivated and able to correct for it (Wegener et al., 1995; Wegener, Petty, & Dunn, 1998). In general, these approaches tend to focus

on shifting people from engaging in heuristic-based, System 1 thinking to more controlled, System 2 thinking (Lilienfeld et al., 2009; Stanovich & West, 2000).

In two in-lab experiments (n = 61, 79) and one online experiment (n = 94) conducted among Israelis and Palestinians, Nasie et al. (2014) first taught participants about naïve realism, defining it as "the human tendency to form one's own worldview regarding various subjects, perceived by an individual as the only truth." Then, they taught participants how engaging in naïve realism correlates with being in conflict, and provided an example of it occurring during a specific conflict. The researchers found that this intervention was most successful among participants who were initially more authoritarian — or 'hawkish' — as these individuals had started out with more biased thinking to begin with, which they could then recognize themselves engaging in and correct for. These hawkish participants who learned about naïve realism reported being more open to the views of the opposing side (e.g., Hawkish Palestinians were more open to Israeli attitudes), and more open to learning about those alternative views from movies, media, and/or meeting with a member of the opposing group (d = 0.40, 0.24, 0.35). On the other hand, less authoritarian — or 'dovish' — participants were more likely to be open-minded to begin with, and thus, the intervention was not effective for them. The researchers note that further research on the long-term effects of this intervention is warranted, in addition to testing the intervention in larger samples.

Though Nasie et al. (2014) taught participants about how naïve realism can lead to conflict, they did not instruct participants on how to avoid engaging in naïve realism. However, some researchers warn that teaching participants about bias may not be not enough. Lord et al. (1984) argue that it is also important to provide people with specific strategies for overcoming bias. In their in-lab study, the researchers exposed proponents and opponents of capital punishment to two essays: one suggesting that the death penalty reduces crime rate and one suggesting that the death penalty is ineffective. Participants (n = 120) read instructions that: (1) were general, (2) told them that they should "be unbiased" and consider all evidence in an impartial manner, or (3) taught them about biased assimilation of evidence and instructed them to consider how evidence supporting an

opposite conclusion would affect their evaluations ('consider-the-opposite'). Whereas participants in the first two conditions displayed more extreme attitudes after reading the essays (d = 0.79, 0.65), participants in the 'consider-the-opposite' condition did not show attitude polarization (n.s.), that is, they remained more impartial. Thus, the 'consider-the-opposite' intervention was thought to be most successful because it incorporated education on a specific bias and also provided tools to reduce the bias.

Some researchers have found that incorporating gamification and personalization into debiasing interventions can boost effect sizes. For instance, Morewedge et al. (2015) created a computer game called *Missing: The Pursuit of Terry Hughes* (Symborski et al., 2014), which teaches participants about three cognitive biases related to open-mindedness (the bias blind spot, confirmation bias, and the fundamental attribution error). In the game, participants are primed to first engage in these biases. Then, they learn the definitions of the biases and receive personalized feedback about the extent to which they engaged in the biases while making decisions during the game. Finally, they learn about another example in which the biases affected a situation in the real world. Then, they have the opportunity to practice making unbiased judgments. Using two in-lab experiments (n = 243, 238) with online follow-ups (n = 196, 192), the researchers compared this 60-minute video game intervention against a 30-minute instructional video that only taught participants about the biases. They found that both interventions were effective in reducing the three types of biases in the short- and long-term. However, the computer game was more effective than the instructional video. Whereas the video produced medium to large effect sizes (d=0.69, 1.75 from pre-to-post intervention; d=0.66, 1.07 at follow-up), the computer game produced mostly large effects (d=1.68, 1.74 from pre-to-post; d=1.11, 1.16 at follow-up). Therefore, the researchers argue that brief, one-shot interventions can be powerful at debiasing, especially when they incorporate gamification, personalized feedback, and opportunities for practice.

Importantly, bias reduction is most likely to occur when participants are motivated to change. Levy and Maaravi (2018) point out that bias awareness interventions can backfire, or 'cause

a boomerang effect,' if their recipients perceive the intervention as a threat to their self-image. These researchers attempted to replicate Nasie et al.'s (2014) findings by teaching participants about two different cognitive biases: the 'halo effect' and the 'powerful women' bias. The halo effect refers to people's tendency to evaluate someone's traits based on an initial (usually positive) evaluation that they make of a different trait. For example, when a person finds someone else to be attractive, they might also assume that that person has other positive qualities, such as being smart or friendly. The powerful women bias is a perception that powerful women are less competent than their equivalent male counterparts. Over three online experiments (n = 81, 111, 121), the researchers found that teaching participants about the halo effect was successful, whereas teaching participants about the powerful women bias was unsuccessful. In the first study, participants in a control condition exhibited bias in their responses (d = 0.75), whereas this bias was heavily reduced for participants who were taught about the halo effect (d = 0.15). The second study found that while female participants did not exhibit bias after being taught about the powerful women bias (d = n.s.), male participants still showed bias (d = 0.50). A third study showed that teaching men about the powerful women bias actually made them *more* biased (d = 0.37). Their explanation for why this occurred was that biases that are perceived to be universal (such as the halo effect) are non-threatening, such that participants can acknowledge that they engage in them without facing social consequences. In contrast, biases that can have negative social implications can be threatening to participants' self-image and therefore harder for them to acknowledge. For instance, admitting to engaging in the powerful women bias may be perceived as tantamount to admitting prejudice against women (i.e., chauvinism). Thus, the researchers argue that it may be necessary to combine awareness training with a complementary intervention that addresses defensively-motivated processes simultaneously (e.g., using self-affirmation to reduce the need to preserve one's self-concept; see this review's next section, "Inducing Open-Mindedness Through Motivational Pathways," for a review of interventions that fit into this category). Given that these studies were conducted with relatively small online samples, and that effects were only present within certain

subsets of participants, replications would be ideal to further delineate the boundary conditions of where teaching about bias interventions can backfire. Nonetheless, these studies indicate that future researchers should consider the possibility of boomerang effects when designing interventions that seek to debias participants.

Overall, studies that have attempted to 'teach about bias' show that debiasing can be effective so long as certain factors are taken into consideration. The effects of debiasing interventions can be moderated by factors such as someone's initial attitudes, personality traits, and culture. They can also interact with affective and motivational processes in unintended ways, potentially making people less open-minded instead of more in cases where an intervention makes someone feel threatened. These boundary conditions support the idea that researchers should implement more integrative debiasing techniques that consider motivational, affective, and social factors in addition to simply teaching about the underlying cognitive biases.

Changing Implicit Theories and Mindsets. In addition to teaching people about the downsides of engaging in biased thinking, researchers have also developed interventions that attempt to alter individuals' 'implicit theories,' which are beliefs that we hold about the world and human nature (Dweck, 2012a). The most common interventions in this category attempt to change how people think about whether certain human attributes are fixed or malleable. Specifically, they try to shift people from holding an 'entity theory' (aka 'fixed mindset'), in which they believe a certain attribute is fixed and/or finite, to an 'incremental theory,' (aka 'growth/malleable mindset') in which they believe an attribute is changeable and/or unlimited. In particular, it is thought that fixed mindsets are associated with being motivated to defend or affirm one's identity, whereas malleable mindsets are more associated with learning goals (Nussbaum & Dweck, 2008). More relevant to this review, people's implicit theories about attributes including intelligence, intellectual humility, and empathy can also affect the extent to which they engage in open-minded thinking and behavior (Dweck, 2012b). Before jumping into the studies relevant for open-mindedness outcomes, it is important to note that much of the work done on mindset interventions is in the educational

domain, investigating whether they can help boost academic achievement. However, findings in this area are mixed, with meta-analyses showing mindset interventions to have small or no positive effects in this domain (Macnamara & Burgoyne, 2023; Burnette et al., 2023). Given that the larger body of work on mindset interventions has produced mixed findings and the fact that a fewer number of studies have directly looked at outcomes relevant for open-mindedness, researchers should use caution when drawing conclusions about these interventions' effectiveness. Nonetheless, some studies have found tentative benefits of mindset interventions for improving outcomes related to open-mindedness, indicating that future research in this area may be warranted.

Beliefs About Intellectual Humility and Intelligence. Shifting people's implicit theories of intelligence from a fixed mindset to a growth mindset has been found to have positive outcomes related to open-mindedness. For instance, in an online experiment (n = 104) conducted on college students by Porter and Schumann (2018; see Study 4), participants read an article that either described intelligence as a static trait (fixed mindset condition) or a trait that can be developed (growth mindset condition). They found that participants in the growth mindset condition reported being more intellectually humble (d = 0.44) and were more likely to make respectful attributions about a hypothetical classmate who disagreed with them (d = 0.40). Relatedly, they found that people who reported being more intellectually humble said that they would be likely to engage in more open-minded behaviors when interacting with the classmate who disagreed with them (r = 0.48). Based on their findings, the researchers argue that interventions that aim to boost intellectual humility can also boost open-mindedness and thus improve social interactions between people who disagree. However, this has yet to be explicitly tested beyond a hypothetical scenario and is a prime candidate for future work.

Although they did not measure its effect on open-mindedness, Porter et al. (2020; see Study 5) ran an online study on mTurk (n = 140) that applied an intervention to boost intellectual humility by having participants in an intervention condition read a news article about the personal benefits of being intellectually humble (i.e., being able to admit what you do not know). Participants in the

opposite condition read an article that touted the benefits of intellectual certainty (i.e., being vocal about showing how much you know). They found that participants in the intellectually humble condition reported being more intellectually humble than those in the intellectual certainty condition (d = 0.34). Participants were also more likely to want to receive further training on a task at which they had previously failed. Although this study's results should be seen as tentative in that it is limited by only measuring intellectual humility through self-report and through an online crowdsourced sample, it is encouraging in that it suggests that interventions, even small ones, can shift intellectual humility. Future researchers should consider examining the relationship between intellectual humility and open-mindedness more closely to determine whether improving intellectual humility has a causal effect on improving open-mindedness.

Beliefs About Empathy. In addition to changing people's perceptions of intelligence, research has also investigated the effect of changing people's implicit beliefs about empathy. For instance, in a series of online mTurk surveys (Studies 2-3), Schumann et al. (2014) found that participants who reported having a malleable theory of empathy were more likely to try to expend 'empathic effort,' or behave in an open-minded manner, toward someone with opposing views (n = 61, 110; r = 0.38, d = 0.24). They then applied an intervention to experimentally manipulate people's implicit theories about empathy (Studies 4-5). They had online participants (n = 112, 91) read an article that either described empathy as malleable or fixed. They found that participants in the 'malleable' condition were more willing to listen to outgroup members' views (d = 0.45, 0.65), indicating a greater willingness to be open-minded. Schumann and colleagues argue that interventions that focus on changing people's theories about empathy are likely to be more effective than simply teaching them skills like perspective-taking, which they might not spontaneously use unless they have the motivation to do so.

However, evidence for the efficacy of mindset interventions for empathy is mixed. A larger longitudinal study that tested the effects of a similar, but more in-depth, intervention found that a

mindset intervention was ineffective at increasing empathy towards the outgroup (Weisz et al., 2020). In this study, college students (n = 292) came into the lab for three separate sessions. They were sorted into one of four conditions: viewing empathy as malleable, learning about social norms around empathy, malleable mindset + social norms, and control (growth mindset of intelligence). During the three sessions, participants engaged in activities that employed the 'saying-is-believing effect' (Hausmann et al., 2008), which included reading articles, reflecting on their own experiences, writing letters to other students, and giving a speech. Eight weeks later, participants completed questionnaires and tasks to assess the impact of the interventions. The researchers found that participants in the two malleable mindset conditions were more likely than the social norms and control conditions to believe that empathy is malleable. Participants in all three intervention conditions showed greater empathic accuracy for others' positive emotions. However, none of these interventions increased empathy toward political outgroup members, empathic accuracy for others' negative emotions, or empathic effort relative to the control condition. The researchers propose that the intervention may have had these mixed results because it focused on strengthening empathic approach motives but not on reducing empathic avoidance motives. Further work is needed to disentangle these varying effects and determine whether inducing a malleable mindset of empathy is an effective strategy to improve open-mindedness.

Another implicit belief about empathy that may be effective in increasing open-mindedness is the idea that empathy is unlimited. In a creative set of studies (Studies 4-5, n = 108, 176), researchers used real-world "performance art experiences" to manipulate the extent to which individuals perceived empathy as being a limited or unlimited resource (Hasson et al., 2022). In these performance art experiences, participants at a performance venue met and talked to actors who played the roles of outgroup members sharing their stories. These studies were conducted across many types of group differences, including ethnic, religious, political, and national. Given the immersive nature of these experiments, researchers were able to capture a wide range of self-report, other-report, and behavioral outcomes. The researchers found that participants who were

taught to believe that empathy is unlimited experienced greater empathy toward outgroup members (d = 0.49, 0.34), supported prosocial actions toward the outgroup, and displayed more empathic behavior toward the outgroup during face-to-face interactions.

Beliefs That Groups Can Change. Other research has attempted to shift people's theories about the ability for entire groups of people to change (group malleability). Halperin et al. (2012) conducted an in-lab experiment where Turkish Cypriots (n = 62) read an article that described groups as either being able or unable to change due to factors like having new leadership. They found that participants in the malleable condition were more willing to have contact with an outgroup individual, a Greek Cypriot, than participants in the fixed condition (d = 0.67). Another study with similar methodology found that Israeli Jewish participants (n = 76) who were in the malleable mindset condition had more positive attitudes toward Palestinians and were more likely to be willing to compromise, as compared to those in the fixed mindset condition (d = 0.56, Study 2, Halperin et al. 2011b). Similarly, they also found that the intervention was effective on these outcomes for Palestinian Israelis (n = 59, d = 0.58, Study 3) and Palestinians living in the West Bank (n = 53, d = 0.60, Study 4). Furthermore, in Study 4, they included an additional outcome measure, finding that the West Bank Palestinian participants in the malleable condition were 70% more likely than those in the fixed condition to be willing to meet and listen to the viewpoint of an Israeli Jew. Although these studies all have fairly small sample sizes, taken as a whole, they indicate that shifting theories about groups might have positive benefits for open-mindedness. Nonetheless, future research should seek to replicate these findings as well as investigating whether similar effects can be produced with other demographics (e.g. opposing political parties).

Perspective-Taking. In contrast to interventions that focus on changing people's implicit theories, other interventions focus more on helping participants practice the cognitive skill of taking other people's perspectives. A large body of literature is dedicated to the technique of 'perspective-taking,' which attempts to help individuals adopt a new perspective, or put themselves 'in another person's shoes' (for a review, see Todd & Galinsky, 2014). Much of this research has focused on how

perspective-taking might be used to improve intergroup relations or to improve open-mindedness. For this reason, rather than diving into the details of every perspective-taking study, we will provide a more high-level overview of how perspective-taking interventions tend to be implemented, along with their potential pitfalls and boundary conditions.

In most perspective-taking interventions, participants review a photograph, video, or recording of a specific individual. Then, they write about a day in the life of that person, imagine the person's mental states, and/or imagine what it would be like to think like that person or experience their situation. Sometimes, participants are asked to 'put themselves in the other person's shoes,' imagining the feelings and thoughts that they would have if they were in the other person's situation. Other times, they are asked just to imagine what the other person thinks and feels.

Recently, researchers have also incorporated more advanced augmented or virtual reality (AR or VR) technology that allows participants to experience the world from another person's perspective, which some researchers have argued is more powerful (Herrera et al., 2018; Van Loon et al., 2018; Yee & Bailensen, 2009). Given that these AR/VR interventions essentially 'give' participants a perspective to understand rather than requiring them to imagine it, it may be appropriate to group them with other 'perspective-getting' interventions, which tend to focus on helping people to more accurately understand another person's perspective by asking them about it (Eyal et al., 2018; see section on "Sustaining and Building on Open-Mindedness Through Social Skills").

Perspective-taking interventions have been used to manipulate many concepts that are related to open-mindedness, including prejudice and intergroup empathy. In their comprehensive review of literature on intergroup perspective-taking, Todd and Galinsky (2014) describe how perspective-taking improves explicit and implicit evaluations of outgroup members, strengthens approach-oriented reactions, increases non-verbal positivity and rapport, facilitates intergroup contact experiences, and undermines stereotype maintenance. Todd and Galinsky suggest that perspective-taking reduces outgroup bias and improves intergroup relations through multiple

mechanisms. It reduces biased attributions (Regan & Totten, 1975; Todd et al., 2012; Vescio et al., 2003), increases perceptions of self-other overlap (Davis et al., 1996; ; Galinsky et al., 2005; Todd & Burgmer, 2013), increases empathy toward outgroup members (Batson et al., 1997; Dovidio et al., 2010), and decreases stereotype accessibility and ingroup favoritism (Galinsky & Moskowitz, 2000).

Although perspective-taking can improve attitudes and behavior toward outgroup members, it can also backfire. Perspective-taking can serve to highlight 'unbridgeable' differences between people (Okimoto & Wenzel, 2011). It can also expose individuals to alternative viewpoints that they perceive as threatening and desire to distance themselves from (Catapano et al., 2019; Paluck, 2010). Furthermore, taking another person's perspective can activate meta-stereotypes, making participants more aware of how their views are likely to be perceived by the other person. Sassenrath et al. (2016) argue that individuals are likely to assume that others who have limited information about them and with whom their group has had conflict in the past are likely to form negative evaluations of them. Thus, concerns about negative self-evaluations can reduce the effectiveness of perspective-taking.

Research has shown that boomerang effects are most likely to occur among individuals who identify strongly with their ingroup (Tarrant, Calitri, & Weston, 2012; Zebel et al., 2009). Non-dominant group members are especially likely to exhibit strong identification with their group, and therefore, they tend not to benefit, and can even suffer adverse consequences, from perspective-taking exercises (Bruneau & Saxe, 2012). For these individuals, perspective-taking must compete with a strong motivation for maintaining their social identity (Jetten et al., 2004), and thus, these individuals are resistant to increased self-other overlap. These findings suggest that interventions that employ perspective-taking should also employ techniques that address motivational concerns for self-integrity. Such interventions include self-affirmation (to be described further in a later section), and emphasizing shared values or similarities (Catapano et al., 2019; McDonald et al., 2017).

Many perspective-taking interventions have been based on the assumption that when simulating the minds of others, individuals are likely to be accurate in their perceptions. However, given a rich understanding of the role of cognitive biases in social perception, researchers have begun to question this assumption. For instance, in a series of 25 studies, Eyal, Steffel, and Epley (2018) found no evidence that perspective-taking improves accurate understanding of another person's viewpoint, despite participants' intuition that it would. They argue that perspective-taking does not give individuals access to new information; to perform perspective-taking, individuals must rely on their stereotypes of others, which can be biased.

Thus, perspective-taking can backfire by increasing biased perceptions. For example, Skorinko and Sinclair (2013) found that perspective-taking increased reliance on stereotypes during decision-making by making stereotypes more salient when individuals simulate the mind of an individual who displays stereotype-consistent traits. Aside from increasing stereotyping, in competitive contexts, perspective-taking can also lead to reactive egoism, or increases in selfish behavior (Epley et al., 2006; Pierce et al., 2013). Individuals assume that their competitors have selfish motives, so when they imagine what it is like to be in a competitor's shoes, individuals defend themselves against being taken advantage of by acting selfishly in return. However, Epley et al. also found that highlighting shared goals can promote a more cooperative environment, which can facilitate reduced egoistic behavior in conjunction with perspective-taking.

Clearly, it is important that people are accurate in their understanding of others' perspectives when engaging in perspective-taking. Certain perspective-taking interventions, such as those that employ AR/VR, may be more effective at giving people an accurate view of alternative perspectives. However, research has found that these interventions tend to be person-specific rather than generalizable (Van Loon et al., 2018). Furthermore, they may not be scalable given cost and accessibility concerns. Another technique that has been shown to promote a more accurate exchange of information, which is referred to as perspective-getting, encourages people to ask another person what they believe rather than making assumptions (Eyal et al., 2018).

Yet another technique that has been used to promote more accurate perspective-taking is holding people accountable to the target of their perspective-taking. For instance, Tuller et al. (2015) conducted multiple studies to examine how perspective-taking might change people's views on controversial issues (e.g., weight discrimination and abortion). In all these studies, they had participants (n = 85, 94) in the lab engage in 'relationship forming' with someone with opposing views (either in person or through reviewing a previous participant's responses). Then, they had participants articulate the other person's opinion on the controversial issue. The researchers found that perspective-taking was only successful in reducing the extremity of people's views when participants were told they would meet the other person who they thought had opposing views, and that this person would be reviewing what they wrote for accuracy purposes (d = 0.47, 0.62). Simply asking people to perspective-take alone did not produce any attitude change. By holding participants accountable, this approach induced accuracy motives to complement the perspective-taking intervention. We will discuss other accuracy-inducing interventions in the section on inducing open-mindedness through motivational pathways.

Paradoxical Thinking. Another strategy to induce open-mindedness involves asking people leading questions or presenting them with arguments that contain exaggerated versions of their beliefs (Knab et al., 2021). According to the researchers, this technique is effective because it proposes an attitude that falls within a person's 'latitude of acceptance' (the range of opinions that they consider to be acceptable), and therefore does not raise a defensive response. However, given that the attitude is extreme, this surprises participants, and ultimately leads them to reflect on and reconsider their own stance. Knab et al. propose that the underlying mechanism that causes this effect is increased cognitive flexibility.

In one online study (n = 161), Israeli Jews in the intervention condition watched video clips that argued that they centered their identity around experiencing conflict and that they could not afford to end the conflict with Palestine (Hameiri et al., 2014). The researchers proposed that this idea was attitude-congruent but also extreme, explaining that most Israeli Jews tend to think of the

conflict as necessary, but not core to their identity. Participants in the control condition watched videos about tourism in Israel. The study found that participants in the paradoxical thinking condition reported that they had reevaluated their opinions and reported that they were willing to endorse compromising with Palestine (η^2=0.04). Furthermore, a greater percentage of participants in the intervention condition later voted for 'dovish' parties who support a peaceful resolution of the conflict as compared to the control condition.

In another in-lab experiment (n = 55), researchers presented Israeli Jews with the following leading question: "Why do you think that the real and only goal the Palestinians have in mind is to annihilate us, in a manner that transcends their basic needs such as food and health?" (Hameiri et al., 2018). While Jewish Israelis might believe that Palestinians have been causing conflict with them, most would not agree with this extreme version of that opinion. When participants were presented with this extreme question, they were more likely to report being open to alternative information regarding the Israel-Palestine conflict compared to participants who saw a neutral question (d = 0.27). A second online experiment (n = 494) confirmed these findings, finding that participants who were exposed to paradoxical thinking were more open to alternative information than those who saw a control (d = 0.14). However, in both these studies, the findings were exclusive to participants who had more extreme rightist opinions on the Israel-Palestine conflict to begin with. The paradoxical thinking intervention had no effect on participants who started with more centrist attitudes, similar to what was seen in the naïve realism study by Nasie et al. (2014).

Additionally, research in this domain shows that paradoxical statements of questions cannot be too extreme if they are to be successful. If they are exaggerated too much, they fall into a participant's latitude of rejection (the range of opinions that the participant considers to be unacceptable), whereby they are immediately dismissed and do not cause participants to reevaluate their own views. Hameiri et al. (2020) argue that paradoxical statements should aim for a 'sweet spot' in which they are only slightly exaggerated. They tested this with regard to Israeli Jews' opinions about refugees and asylum seekers. They divided 201 online participants into four

conditions and asked them to read a news article that was consistent with their views (i.e. it proposed that Israel should not provide refugees with health care). In two of the conditions, participants read articles that were not exaggerated. In the third condition, the article made an argument that was slightly exaggerated. In the fourth condition, the article's argument was extremely exaggerated. They found that the only condition in which participants reported reevaluating their beliefs was in the third "sweet spot" condition (d = 0.14). Furthermore, echoing the results from the previous study, this effect was only observed for participants who reported high levels of moral conviction with regards to their original beliefs. Overall, the current evidence for paradoxical thinking is still tentative and indicates these interventions may only be effective on people with extreme beliefs. Future work is needed to replicate these effects and understand their boundary conditions.

Puncturing the Illusion of Explanatory Depth. Another intervention that aims to encourage participants to reflect on their thoughts and opinions involves taking participants through an exercise in which they realize they know less than they thought. In the literature, researchers refer to this as 'puncturing' a bias called 'the illusion of explanatory depth,' whereby people think that they know more about complex phenomena than they really do (Rozenblitz & Keil, 2002). These studies first ask participants to rate their level of understanding with regards to a complex phenomenon (e.g., how toilets flush, how the brain coordinates behavior, or how the United States Supreme Court determines the constitutionality of laws). Subsequently, participants are asked to write a detailed and step-by-step, causal explanation of how the phenomenon works. Then, they read an article that actually explains how it works, which tends to reveal that the participant knew less about the phenomenon than they thought. Finally, participants rate how well they actually understood the phenomenon prior to learning about it from the article.

Studies have found that puncturing the illusion of explanatory depth reduces participants' overconfidence in their own knowledge (Rozenblitz & Keil, 2002; Fernbach et al., 2013; Voelkel et al., 2018; Crawford & Ruscio, 2021). Yet findings have been mixed with regard to the impact of this

intervention on political attitudes. In two online experiments, Fernbach et al. (2013) had participants recruited from mTurk (n = 198, 141) explain complex political policies in detail. They found that participants reported having less extreme political attitudes after going through the intervention, as compared to participants who were told to enumerate the reasons for their political position (η^2 = 0.066, 0.14). Another online experiment had mTurk participants (n = 224) merely "reflect on how well you could explain to an expert, in a step-by-step, causally-connected manner the details of … [a sociopolitical] issue". (Johnson et al., 2016; see Experiment 9). Similarly, they found that the intervention reduced participants' overconfidence and attenuated the extremity of their attitudes (d=0.33). However, recent research had more mixed results (Crawford & Ruscio, 2021). In attempting to replicate the study by Fernbach et al. (2013), the researchers found that the intervention reduced overconfidence but did not affect attitude extremity (n = 306, 405). Further work will be required to better understand these effects. However, It may still be possible that puncturing the illusion of explanatory depth is an effective technique for promoting open-mindedness, if not attitude change. Light and Fernbach (2020) propose that the illusion of explanatory depth and other 'knowledge calibration' techniques can help to promote intellectual humility, which in turn may produce greater open-mindedness.

Correcting False Meta-Perceptions. Other research has found that giving participants feedback about the accuracy of their meta-perceptions about people with opposing views reduces their bias toward them. For instance, Lees and Cikara (2020) found that participants thought that members of the political outgroup felt more negative toward their ingroup than the outgroup members really did. The researchers also found that a simple intervention was effective at mitigating this bias. They showed online mTurk participants (Study 6, n = 1122) their own estimates of the outgroup's beliefs alongside data that revealed the outgroup members' actual (more positive) beliefs. They found that showing participants this corrective feedback led to reductions in their negativity bias (d = 0.07). Additionally, a large-scale replication (n = 4801) found that this intervention effect replicated in nine out of ten countries (Ruggeri et al., 2021).

Moore-Berg et al. (2020) propose that meta-perceptions may be easier to correct than first-order beliefs: "convincing people that they are wrong about others' minds may be easier than convincing them they are wrong about their own minds." To explain this, the researchers suggest that this is because meta-perceptions are reliably false and pessimistic. Lees and Cikara (2021) propose that people are more open to corrections to their meta-perceptions because they are motivated to manage their reputation. In order to manage the impression that others have of them, people need to have an accurate understanding of what that impression is. Overall, this nascent area of research demonstrates promising effects for promoting open-minded thinking.

Domain-General Cognitive Approaches

In addition to debiasing training, mindset interventions, and perspective-taking, other interventions have attempted to improve open-mindedness through more domain-general cognitive pathways. These interventions involve broadening and complexifying thinking patterns (again, promoting System 2 over System 1 processing) through techniques such as cognitive disfluency, self-distancing, priming creativity, mood inductions, and cognitive training.

Cognitive Disfluency. Researchers have found that cognitive disfluency (i.e. making text difficult to read) can induce analytical (System 2) thinking, which tends to be less prone to cognitive biases (Alter et al., 2007). Given this effect, studies have tested whether disfluency can improve open-mindedness toward others. For instance, in an online mTurk experiment conducted by Yang et al. (2013), the researchers had participants (n = 156) read a passage that was either easy or hard to read (Study 3). Following the manipulation, participants read about a proposal to build a mosque near the 9/11 Ground Zero site and then provided reactions to the proposal (a composite of behavioral, affective, and cognitive measures). Both conservatives and liberals who viewed the hard-to-read passage showed less polarized attitudes ($\eta^2_{intervention} = 0.15$) compared to those who viewed the easy-to-read passage ($\eta^2_{control} = 0.42$). In a similar in-lab experiment on fluency and the confirmation bias, Hernandez and Preston (2013) found that presenting participants (n = 133) with counter-attitudinal information in a hard-to-read font reduced the extent to which participants

evaluated the information in a biased and extreme way ($R^2_{control}$ = 0.13, $R^2_{intervention}$ = n.s.). Thus, disfluency might promote more thorough consideration of counter-attitudinal information as opposed to 'knee-jerk' reactions against it.

Self-Distancing. One factor that influences how people think about events, people, and ideas is the extent to which they feel removed, or 'psychologically distant', from those things. According to construal level theorists, taking a more psychologically distant perspective induces people to be in an abstract, rather than concrete, mindset (Trope & Liberman, 2010). This abstract mindset can induce changes in various cognitive processes, including perception, decision-making, and problem-solving. One application of psychological distancing, self-distancing, specifically induces this more analytical and abstract thinking style to encourage people to transcend beyond their own egocentric view of the world. Self-distancing involves taking a detached, third-person perspective towards one's own experiences, and is thought to lead people to focus less on the emotionally arousing components of their memories and more on self-reflection (Kross & Ayduk, 2017). This approach involves having people remember events that happened to them and view them from an outsider's perspective. For instance, they might imagine themselves watching the event as a 'fly on the wall' or refer to their past self using third-person pronouns. In contrast, a person who is in a self-immersed mindset might remember past experiences by reliving them 'through their own eyes' from a first-person perspective. Self-distancing has been used as one form of reappraisal, an emotion regulation technique that can help people *remain* open-minded during heated interactions. We will discuss these applications in this review's section on 'Sustaining and building open-mindedness through affective pathways'. In the current section, we will focus on how self-distancing can act through a cognitive pathway to *induce* open-minded thinking in the first place.

In two in-lab studies, researchers found that participants (n = 57, 54) who reasoned about personal issues from a distant (versus immersed) perspective were more willing to express intellectual humility (i.e., 'recognize the limits of their knowledge'), endorse more moderate political opinions, and report being willing to join a bipartisan group that would discuss political issues

(Probability of superiority = 0.68; Kross & Grossmann, 2012). While these two studies had fairly small sample sizes, other more recent studies have found similar effects. Another in-lab longitudinal study (n = 290) involved training people over the period of one month to reflect on interpersonal challenges from a third (versus first) person perspective (Grossmann et al., 2021). The researchers found that participants in the third person (self-distancing) condition showed greater wise reasoning (r = 0.12), with improvements in intellectual humility, acknowledgement of diverse viewpoints, and search for conflict resolution. In a follow-up study (n = 406), the researchers demonstrated the same effects over the course of a week (r = 0.08), suggesting that self-distancing training can be achieved over a shorter timespan.

In addition to self-distancing, studies have found other forms of psychological distancing (e.g. temporal distancing, spatial distancing, etc.) to produce beneficial effects, such as increasing creativity, improving problem-solving, reducing negative affect, reducing physiological stress, and reducing emotional reactivity (Kross & Ayduk, 2011; Förster et al., 2004; Jia et al., 2009; Kross & Ayduk, 2017). However, as of yet, most of the distancing research related to open-mindedness has focused on self-distancing, and applying these other forms of psychological distancing as open-mindedness interventions is still a nascent area of research.

Positive Mood Inductions. Research has found that putting participants into a positive mood can also broaden their thinking. Positive mood inductions include providing participants with refreshments, giving them a small gift, having them watch a short comedy clip, priming them with positive statements, or having them recall a positive memory. Overall, the findings in this domain are mixed. According to Fredrickson's 'broaden-and-build theory' (Fredrickson, 2001; Fredrickson, 2004; Fredrickson & Branigan, 2005), positive emotions broaden individuals' 'thought-action repertoires.' According to this theory, inducing a positive emotion should expand a person's mind so that they can come up with more thoughts and potential actions, increasing their ability to be open-minded. A competing theory, the 'mood-as-information' approach (Schwarz, 2000), alternatively suggests that moods signal information to individuals about their situation and guide them to react accordingly.

According to the mood-as-information approach, positive moods should signal the absence of a threat and lead individuals to rely more on heuristic thinking, whereas negative moods should signal that the individual needs to be alert to a potential problem in the environment and result in more deliberative processing. Thus, in contrast, this theory suggests inducing positive moods may actually hinder open-mindedness.

In support of the 'broaden-and-build' theory, mild positive affect inductions have been shown to enhance cognitive flexibility (Murray, Sujan, Hirt, & Sujan, 1990), promote creativity (Isen et al., 1985; Isen, Daubman, & Nowicki, 1987) and reduce biased anchoring effects (Estrada, Isen, & Young, 1997). Some tentative work has found that positive mood inductions can promote open-mindedness. Nelson (2009) conducted two studies in which she induced participants to be in a positive, negative, or neutral affective state. In Study 1, she had participants (n = 80) either write about their morning routine (neutral condition) or about a time when they were elated, joyful, or proud (positive affect). In Study 2, participants (n = 114) read a series of statements out loud that were positive (e.g., "Most people like me."), negative (e.g., "Nobody understands me or even tries to."), or neutral (e.g., "It snows in Idaho."). In these studies, Nelson found that participants in the positive condition were more likely than participants in the neutral and negative conditions to engage in cognitive perspective-taking (d = 0.61, 0.52) and to express more empathic concern for dissimilar others. Notably, these studies had low statistical power and so the findings should be viewed tentatively. Further work should be done to confirm these effects.

In contrast, although these studies found that positive affect led to increased open-mindedness, other researchers have found that positive mood can impair cognitive functioning, such as planning (Oaksford et al., 1996), working memory (Spies et al., 1996), and task switching (Phillips et al., 2002). In the domain of social cognition, Park and Banaji (2000) had participants in three studies (n = 58, 68, 90) watch a 10-minute video that was happy, neutral, or sad. They found that inducing happiness led participants to rely more on stereotypes when making social judgments (d = 0.6, 1.14, 0.98); in contrast, sadness led to less stereotyping. They argued that positive affect led to

heuristic processing and negative affect led to detail-oriented thinking, in line with the 'mood-as-information' approach. Again, due to low statistical power these findings should be seen as tentative and more work must be done.

To reconcile the research showing that positive mood improves cognitive functioning in some situations and inhibits it in others, Mitchell and Phillips (2007) propose that positive mood generally leads to heuristic thinking, but that motivational factors can modify its effects, such that positive mood can be beneficial when situations involve novel information-seeking. Altogether, little work on how positive mood inductions can be used as open-mindedness interventions has been done, and what research has been done is speculative and mixed in outcome. Further studies are needed to tease apart the contexts in which positive affect is beneficial for promoting open-mindedness. Researchers should consider combining a positive mood induction with other manipulations that might encourage information-seeking. It is also necessary for researchers to determine how much positive affect should be 'administered,' and how long the effects of positive mood inductions last.

Cognitive Training. Other more domain-general approaches for inducing open-minded thinking include adaptive, cognitive training and neurofeedback. These approaches attempt to improve low-level cognitive mechanisms that underlie open-mindedness. For instance, one study focused on improving participants' 'metacognitive awareness' – which is also referred to as 'confidence calibration' or 'introspective ability' (Carpenter et al., 2019). Prior work has found that people who are dogmatic have impaired metacognitive abilities, which suggests that cognitive training that focuses on improving these abilities may be beneficial for boosting open-mindedness (Rollwage et al., 2018; Rollwage & Fleming, 2021). In the study by Carpenter et al., online mTurk participants (n = 61) completed 8 sessions during which they completed a perceptual discrimination task and received feedback. In the intervention condition, participants received feedback with regards to the accuracy of their metacognitive judgments (i.e., the extent to which their confidence ratings aligned with their performance). In the control condition, participants received feedback

about their task performance alone. The study found that only participants in the intervention condition showed improvements in their introspective abilities (d ≈ 0.65). Notably, this study uses a relatively small sample of online crowdworkers, and so the results should be viewed tentatively.

Another cognitive training study used video games to improve participants' cognitive flexibility (Glass et al., 2013). This work may be relevant for increasing open-mindedness given that prior research has found that individuals with more extreme attitudes also exhibit cognitive inflexibility (Zmigrod, 2020). In the video game training study (n = 72), participants in the intervention condition played a 'real-time strategy' video game called StarCraft, which required fast thinking and rapid switching between multiple information sources. Participants in the control condition played a 'life simulation' game called the Sims 2 over the course of 40 hours, which did not require the same kind of strategizing. The study found that participants in the intervention condition showed improvements in their cognitive flexibility (d ≈ 0.4).

The studies reviewed in this section thus far are both tentative in nature, and much more academic work must be done to determine the benefits of cognitive flexibility training for open-mindedness. However, moving past research done within academia, it may also be relevant to consider the realm of commercial brain training — which tends to consist of brief cognitive games that have been developed by companies. Many researchers disagree about the extent to which these games are effective, primarily because their effects do not often transfer to improved cognitive performance on other tasks (Owen et al., 2010; Simons et al., 2016). Furthermore, to our knowledge, no published research has measured the impact of these low-level cognitive trainings on open-mindedness specifically (only on its underlying mechanisms). Thus, further work will be needed in order to determine whether these approaches are effective at boosting open-mindedness.

Psychedelics. One final domain general cognitive approach warrants mention. Over the past decade, there has been a resurgence in research on the benefits of psychedelic drugs. In addition to helping with mental health concerns like depression and post traumatic stress disorder, the primary effects of psychedelic administration appear to be greater openness and creativity (MacLean,

Johnson, & Griffiths, 2011; Mason et al., 2021). A prominent neurocognitive model of psychedelics suggests that they operate by allowing individuals to move more easily between different brain states, thus allowing a person to more easily explore different possible beliefs and points of view (Carhart-Harris & Friston, 2019). In the context of ideological polarization, one study (n = 14) found that psychedelic administration led to reduced authoritarianism (d = 0.87) 7 months after the experimental session (Lyons & Carhart-Harris, 2018). Also, of note, one study interviewed 31 Israelis and Palestinians who took psychedelics together and found that they reported experiencing various insights that allowed them to feel greater connection to one another (Roseman et al., 2021). Although the effects of psychedelics on open-mindedness have only received limited experimental study due to the difficulties in acquiring large samples, the strength of these effects may end up being quite dramatic compared to other lab-based interventions and are worth exploring further.

Inducing Open-Mindedness Through Motivational Pathways

In addition to cognitive factors, when people are processing viewpoints that challenge their opinions, motivational factors also impact their open-mindedness toward those viewpoints. In their wide-ranging review of 'wise interventions,' which they define as interventions that aim to increase human flourishing, Walton and Wilson (2018) focus on three primary motivations that are relevant to open-mindedness: 'the need to be accurate,' 'the need for self-integrity,' and 'the need to belong.' Similarly, according to Van Bavel and Pereira's (2018) 'identity model of beliefs,' individuals balance accuracy goals against identity goals (e.g., belonging, epistemic, existential, status, system justification, and moral goals) when they process information. The researchers argue that the mind places a 'weight' on all accuracy and identity goals as a function of an individual's disposition and their social context.[3] They argue that people try to process information in an accurate and unbiased manner when the weight placed on accuracy is larger than the net weight of the identity goals.

[3] The researchers developed this conceptual formula to illustrate their model, where V represents the value placed on holding accurate beliefs and w represents the weight put on each goal. $V = w_1\text{Accuracy} - \sum(w_2\text{Belonging} + w_3\text{Epistemic} + w_4\text{Existential} + w_5\text{Status} + w_6\text{System} + w_7\text{Moral}...w_n\text{OtherGoals})$

However, people tend to engage in biased thinking when their identity goals supersede accuracy goals. In particular, political partisanship tends to satisfy identity goals, and when there is a large weight placed onto those goals, it can distort information processing and lead to rigid, dogmatic thinking. Based on these models, we propose that interventions can take three motivational routes to promote open-mindedness toward alternative viewpoints: upweight accuracy motives, preemptively satisfy the need for self-integrity, and/or leverage the need to belong.

Promoting Accuracy Motives. Studies have shown that promoting the goal of processing information accurately can help to reduce biased thinking (Kunda, 1990; Lerner & Tetlock, 1999). Incentivizing people to be accurate (e.g., through monetary rewards) can help to mitigate bias. For example, in an online mTurk experiment (n = 331), Waytz, Young, and Ginges (2014) offered some participants incentives to provide accurate evaluations of the opposing political party. They found that participants who were given accuracy incentives exhibited less of a bias called 'motive attribution asymmetry,' wherein participants tend to attribute positive motives to their political ingroup and negative motives to the political outgroup (d = 0.56). Furthermore, these incentives also improved participants' willingness to negotiate with the opposing party, improved their optimism around being able to reach a compromise, and reduced their tendency to hold negative, essentialist beliefs about the other party. Similarly, in two experiments Bullock et al. (2013) found that paying online participants (n = 626, 795) when they answered accurately (or admitted that they did not know the answer) reduced party differences in response to questions about politics. For example, with or without being offered incentives for accuracy, liberals and conservatives provided different responses to the following question: "Compared to January 2001, when President Bush first took office, has the level of inflation in the country increased, stayed the same, or decreased?" When compared to participants who were not incentivized for accuracy (or admitting they did not know the answer), participants who were offered incentives showed a partisan gap in responses that was smaller on average by about 55-60%.

Another method for promoting accuracy is holding people accountable for being accurate. According to Lerner and Tetlock (1999), informing people that they will be held accountable can boost open-minded thinking under specific conditions. Methods for convincing people that they will be held accountable include telling them that they will be evaluated, telling them they will have to justify their responses, and telling them their responses will be made public (Kunda, 1990). Lerner and Tetlock argue that accountability interventions are most effective when people are told "they will be accountable to an audience (a) whose views are unknown, (b) who is interested in accuracy, (c) who is interested in processes rather than specific outcomes, (d) who is reasonably well-informed, and (e) who has a legitimate reason for inquiring into the reasons behind participants' judgments." According to their review of accountability studies, accountability interventions can attenuate a wide range of cognitive biases that are related to open-mindedness, including making biased attributions and stereotyping.

While it is clear that incentivizing people to be accurate through monetary rewards is effective as an open-mindedness intervention, some researchers argue that merely priming accuracy goals with subtle manipulations may be enough to achieve positive outcomes. One collection of studies found that priming people for accuracy reduced the extent to which they chose to share political misinformation (Pennycook et al., 2021). The researchers effectively primed accuracy using two methods. One method involved showing participants a politically neutral headline and asking them to rate the headline's accuracy. The other method involved asking participants to indicate whether or not they agreed that "it is important to only share news content on social media that is accurate and unbiased." The authors applied their intervention to real users on Twitter (Study 7, n = 5379), asking them to rate the accuracy of a single non-political headline and then measuring the amount of misinformation these accounts shared over the next 24 hours. They found that users who received this intervention had a slight increase in the quality of the news sources they shared, compared to baseline participants (d = 0.04). Van Bavel and Pereira (2018) have also suggested that priming people to think "like scientists, jurors, or editors" might also help to promote accuracy

motives. While the effects of priming accuracy are smaller and more tentative than that of concrete financial incentives for correctness, the effects of these subtle accuracy manipulations is a promising area for future research.

Satisfying the Need for Self-Integrity. In addition to upweighting accuracy goals, researchers have also tested the efficacy of satisfying identity motives to help reduce biased information processing. In particular, identity-based interventions can either try to satisfy a need to defend one's self-integrity or leverage one's need to belong. The thinking behind interventions that focus on self-integrity is that alternative viewpoints can serve as potential threats to a person's need to be accurate and consistent in their beliefs. Instead of being open to being wrong when someone disagrees with them, many people will double down on their own beliefs in order to preserve the idea that they are accurate and consistent. In an individual context, this can translate to engaging in motivated reasoning, confirmation bias, and selective exposure. Interpersonally, people tend to defend their views rather than consider that they could be wrong. Interventions can try to preemptively buffer against these threats by satisfying those needs beforehand. Once individuals' needs are satisfied, they do not need to interpret information in a biased way in order to fulfill their needs.

One of the primary techniques that has been developed to fulfill individuals' need for self-integrity is self-affirmation (Steele, 1988). Self-affirmation is a process by which individuals affirm important values (e.g., family, friendship, etc.). Typical manipulations involve asking participants to rank their values and then to write about times in the past when those values were important. The effects of self-affirmation are transferable, such that an individual can receive self-affirmation with regard to a specific set of values, and that manipulation can buffer against threats to self-integrity in a different domain (Steele, 1998).

In reducing defensive responding, participants are able to engage in less biased, more objective consideration of information. For instance, using 3 in-lab experiments (n = 72, 80, 64), Cohen et al. (2000) found that affirmed participants were more persuaded by evidence contrary to

their own political views (d = 0.34, 0.24), as well as more critical of an argument put forward by an individual who shared their political views (d = 0.30). Relatedly, Ward et al. (2011) found in two in-lab experiments (n = 52, 111) that self-affirmation reduced the extent to which students derogated a concession from their professor (i.e., reduced their 'reactive devaluation' of the professor's concession, partial η^2 = 0.11, 0.07), an effect which was not explained by distraction or explicit mood enhancement. Finally, using two in-lab experiments, Binning et al. (2015) found that American participants (n = 115, 159) who self-affirmed were more convinced by factual evidence about the nation's economy rather than national polling data (normative information) when it came to evaluating President Obama's policies (partial η^2 = 0.07, 0.03). Although all of these studies should be seen as tentative, due to small sample sizes, taken as a whole they provide moderate evidence to suggest that self-affirmation leads to more objective evaluation, and in some cases, more open consideration of alternative views.

In addition to measuring the effects of self-affirmation on information processing via self-report, recent research has involved using neural measures to assess the impact of these interventions. In an exploratory in-lab neuroimaging study (n = 146), Dieffenbach et al. (in prep) used a technique called the 'neural reference groups approach' (Dieffenbach et al., 2021) to investigate whether a self-affirmation intervention could shift how people processed videos containing political opinions they disagreed with. They found that self-affirmation altered participants' neural processing in the brain's mentalizing network, such that participants who were affirmed showed more similarities in neural activity than those who were not affirmed while watching these counter-attitudinal videos (d = 0.33). This study suggests that neuroimaging can help to 'get under the hood' in assessing the impact of self-affirmation interventions, especially when self-report is found to be unreliable. However, this approach has not yet been used to determine whether self-affirmation reduces biased information processing, but only to show that in the moment processing is affected by self-affirmation.

Despite evidence to support that self-affirmation may be effective, other work has shown that self-affirmation interventions may be delicate and only work under certain boundary conditions. For instance, in three in-lab experiments (n = 43, 35, 39), Cohen et al. (2007) found that self-affirmation was only effective when an individual's beliefs about the issue were made salient. This effect occurred in the context of individuals reading a counter-attitudinal report and also engaging in a negotiation with a confederate who purportedly held opposing views. Participants who were affirmed and had their partisan identity and convictions made salient provided more positive evaluations of the opposing viewpoint and made more concessions during the negotiation (d = 0.40, 0.59, 0.29). In contrast, participants who were affirmed and who were instructed about the importance of compromise made fewer concessions. According to Cohen and colleagues, identity salience may serve to alert individuals about the stakes of coming to a compromise with another party. In contrast, simple instructions about the virtues of compromise and rationality may make the individual focus more on behaving according to those virtues, but less focused on the outcome of their interaction.

Self-affirmation interventions that do not manipulate identity salience may be less effective. A recent report found that several previously unpublished studies had failed to find significant effects in terms of self-affirmation on political outcomes (Lyons et al., 2021). They found that self-affirmation did not affect a wide range of outcomes related to open-mindedness, including belief superiority, affective polarization, evaluation of news sources, and endorsement of factual beliefs. However, none of these studies manipulated identity salience, which may partially explain why they were not effective, according to the researchers. They also argue that it is possible that self-affirmation does not actually work, and that the findings of previous self-affirmation studies may have been spurious due to small sample sizes, inconsistent methods, and different contingent effects. Thus, further work is required in order to understand whether self-affirmation is an effective intervention to increase open-mindedness and under what conditions it best functions.

Leveraging the Need to Belong. In addition to satisfying identity motives as a way to downweight their effect on cognition and behavior, some interventions focus on leveraging and upweighting identity motives to encourage people to be open-minded. In particular, given people's need to belong (Baumeister & Leary, 2017), this may lead people to seek out similarities between themselves and others, encouraging them to connect and form affiliative relationships, even if it means shifting their original attitudes. Currently, there are not many studies that attempt to upweight participants' need to belong in an attempt to promote open-mindedness; however, this effect has been tentatively demonstrated in a study by Chen et al. (1996). In this in-person experiment (Study 2, n = 67), participants were told that they were going to be interacting with another participant (although they did not actually end up interacting with the partner). Beforehand, they were either primed with accuracy motives or impression-based motives. To do this, researchers asked participants to imagine they were in hypothetical scenarios and to write out what they would do. For instance, in one of the accuracy prompts, participants were asked to imagine being a reporter trying to identify the facts of a story. In one of the impression prompts, participants were asked to imagine that they had been set up on a blind date with their friend's cousin who they were not attracted to. Participants also learned about the attitudes of their future interaction partner on a particular social issue. Then, they indicated what their own attitudes were on the issue. The researchers found that participants in the impression condition were more likely to conform their attitude toward their partner's attitude (d = 0.37), whereas participants in the accuracy condition seemed to show no conformity effect. These findings can be tentatively interpreted as showing that priming a desire to belong or connect can be effective at promoting agreement between participants.

The need to belong is often manipulated in social psychology experiments by inducing a feeling of rejection in participants (e.g. telling them they will be alone in the future; Baumeister et al. 2002). The effectiveness of these sorts of manipulations on improving open-mindedness are yet to be tested; however, one can easily imagine an experimental paradigm where a participant is made

to feel isolated and then given the opportunity to bond with an outgroup member. A robust body of psychological literature on the "contact hypothesis" (Allport, 1954) suggests that such an intervention may have positive benefits (the related topic of intergroup contact is discussed in the "Interventions that Target Multiple Pathways" section). It is also possible that rather than leveraging participants' "need to belong," researchers might seek to harness adjacent drives such as a desire to avoid conflict and people's natural tendencies to build rapport with conversation partners. Pilot evidence from our lab's attempts to bring together ideological opponents to have discussions suggest that people often jump quickly towards middle ground to avoid expressing any real disagreements with their conversation partners. These adjacent drives are discussed in greater detail in the Rapport Building subsection of the Sustaining and Building on Open-Mindedness Through Social Pathways section. In summary, although there does not currently exist much evidence for leveraging the need to belong as a motivational route to improve open-mindedness, this appears to be an area ripe for future testing, as the proposed mechanism of action is supported by many adjacent areas of work.

Sustaining and Building on Open-Mindedness Through Affective Pathways

In the previous sections, we discussed interventions that attempt to *induce* open-mindedness by targeting cognitive and/or motivational processes within the individual. In this section, we will discuss interventions that attempt to *sustain* and build on open-minded thinking by helping people to regulate their emotions (see Čehajić-Clancy et al., 2016, for a framework of how emotion regulation interventions can enable intergroup reconciliation). These interventions focus on teaching people to regulate their negative emotions through direct or indirect methods. Researchers have noted that in addition to training people to regulate their emotions, it is also important to ensure that they are motivated to regulate their emotions in intergroup contexts (Halperin, 2014a).

Cognitive Reappraisal. While positive mood inductions focus more on making individuals open-minded in the first place, other interventions teach emotion regulation strategies in order to

help people *remain* open-minded when they encounter alternative viewpoints in a social context. In the context of interactions between individuals with different viewpoints, it is important to reduce their expressions and experiences of negative emotions in order to sustain a constructive conversation. Cognitive reappraisal is one such strategy for doing so, characterized by thinking about a situation differently in order to alter its emotional impact. Reappraisal sometimes relies on meta-cognitive strategies such as self-distancing; however, we choose to classify it under the affective pathway, rather than the cognitive pathway, in order to emphasize that its use as an emotion regulation strategy is best applied *during* an interaction, rather than before.

Interventions applying reappraisal to open-mindedness have largely focused on the relationship between cognitive reappraisal and improving relations between those with opposing views (Halperin & Gross, 2011a; Halperin & Tagar, 2017; Halperin, 2014a). Initial surveys (n = 201) found a positive correlation (r = 0.29) between Israelis' tendency to spontaneously reappraise negative emotions and their support for policies that would provide aid to Palestinians (Halperin & Gross, 2011a). Next, researchers manipulated cognitive reappraisal experimentally. Halperin et al. (2013) taught Israeli participants to engage in reappraisal by handing them anger-inducing pictures and asking them to respond to the pictures "like scientists, objectively and analytically." Following the training, participants were instructed to apply this technique while they were presented with information about the Israeli-Palestinian conflict. In two in-lab studies (n = 39, 60), the researchers found that participants who were trained in reappraisal supported more conciliatory policies between Israelis and Palestinians (d = 0.79). Furthermore, this effect was long-lasting — differences between the intervention and control group remained at a five-month follow-up (d = 0.74). The researchers also found that the effect was mediated by reductions in anger toward Palestinians, suggesting that the reappraisal training led participants to downregulate their negative affect in relation to the political issue.

Recently, researchers tested the efficacy of a mobile game intervention, ReApp, that teaches reappraisal strategies (Porat et al., 2020). In the experiment (n = 70), Jewish-Israeli participants

learned about the strategy of reappraisal in the context of the mobile game ReApp. Then, they were paired with a partner and practiced reappraising one another's emotions in response to images (e.g., reappraising extreme sadness in response to a picture of a dog in a cage). Participants who played ReApp (as opposed to Connect Four in the control condition) experienced lower levels of disgust and anger and expressed less support for aggressive policies against Palestinians (d = 0.55) . This study provides encouraging evidence that reappraisal can be taught in a scalable manner that does not require in-person training or feedback.

Although training in cognitive reappraisal can be effective, researchers argue that this intervention may only be successful when people are motivated to regulate their emotions. As Halperin et al. (2014b) point out, people who are involved in intractable conflicts are likely to be driven by a motive to maintain their group identity, and reacting negatively to an opposing group can make up part of that group identity. In fact, Tamir et al. (2019) suggest that most cognitive reappraisal interventions involve simultaneously activating an emotion goal — such as decreasing negative emotions — and also providing participants with the means to achieve that goal. They conducted an in-lab study (Study 3B, n = 137) among Israeli participants to test the effects of three conditions in decreasing anger toward a video depicting Palestinians: control (watch video naturally), emotion goal (telling participants to decrease their emotion reaction), and emotion goal + reappraisal training. They found that activating the emotion goal alone was as effective as the emotion goal + reappraisal condition in terms of decreasing self-reported negative emotions and angry facial expressions (as measured by lower corrugator activity) in comparison to the control condition (d = 0.50). They concluded that it may be sufficient to simply activate emotion goals, rather than teaching the technique of reappraisal, in order to reduce negative emotions.

Indirect Emotion Regulation. Given that individuals may not always be motivated to regulate their emotions, some researchers have advocated for the potential of 'indirect emotion regulation' strategies as a means to reduce negative emotions in intergroup contexts (Halperin et al. 2014b). Indirect emotion regulation works by targeting an emotion to alter, identifying a cognitive

appraisal that underlies that emotion, and then altering that underlying appraisal. In particular, the interventions that have been tested in this domain manipulate a fixed versus malleable mindset. In this review, we have placed these strategies in the cognitive section given that they explicitly target cognitive mechanisms, but it is worth noting here that they have downstream consequences for affect. According to researchers who identify these as indirect emotion regulation strategies, instilling the belief that an opposing group or a conflict situation is malleable rather than fixed leads to reduced anger toward an opposing group (Halperin et al., 2011b), greater perceptions of hope (Cohen-Chen et al., 2014), and reduced intergroup anxiety (Halperin et al., 2012). Yet again, this line of research points to the idea that open-minded interventions involve a complex interplay between cognitive, motivational, and affective processes.

Overall, helping individuals learn emotion regulation strategies may be an effective way to ensure that people with opposing views can be open to listening to one another and engaging in active dialogue. Further, guiding the appraisals that people make about concepts such as group malleability can help guide the emotions that they experience toward members of opposing groups. Given that people experience a diverse range of emotions in the context of intergroup relations (and many appraisal dimensions), researchers might explore the downstream effects of shifting other appraisal dimensions, such as intentionality and agency. In addition, since much of the work on improving emotion regulation has been conducted in the specific context of the intractable conflict between Israel and Palestine, it would be useful to conduct studies that replicate these findings in a variety of contexts (e.g., between liberals and conservatives in the United States, between students and professors, between acquaintances, etc.) to ensure their generalizability.

Encouraging Emodiversity. Recent research has proposed that it is not always necessary to focus on downregulating emotion in order to promote open-mindedness. Across five studies, Grossmann et al. (2019) found a robust relationship between people's tendency to recognize and experience a range of emotions — emodiversity — and a tendency to engage in wise reasoning. In these studies, they measured emodiversity using sentiment analysis of interview transcripts (Study

1) and a formula developed by Quoidbach et al. (2014) that incorporates multiple self-report items (Studies 2-5). They found that participants with higher emodiversity also reported having higher intellectual humility, were more likely to consider diverse perspectives, were more likely to adopt a distant (rather than immersed) viewpoint, and were more likely to search for compromise. Similarly, participants with more emodiversity scored higher on the situated wise reasoning scale, a measure of state-level wise reasoning (partial $\eta^2 \approx .08$).

Although there is compelling evidence for there being a positive relationship between emodiversity and wise reasoning, less work has been done to develop interventions to promote emodiversity. Grossmann et al. attempted to do so in three of their studies (Studies 4a-c, n = 1526) using a few different methods. They had online mTurk participants attempt to appraise their emotions in a differentiated versus simple (good/bad) manner and they had participants focus on multiple emotions that they had experienced versus one strong emotion. However, they did not find that any of these approaches worked to increase emodiversity (n.s.). This may imply that emodiversity is largely a stable trait within individuals, more akin to a personality trait. In this case, it may be more appropriate to consider whether the extent to which an individual exhibits emodiversity may act as a moderator for other open-mindedness interventions. Alternatively, it may simply be that the manipulations used in the above studies were not powerful enough to actually shift emodiversity. Further work will be needed to see whether it is possible to boost emodiversity, and to examine the causal effect between emodiversity, wise reasoning, and open-mindedness.

Sustaining and Building on Open-Mindedness Through Social Pathways

While it is important for individuals to manage their own emotions to maintain an open-minded state, it is equally essential to equip them with better social tools to navigate potentially difficult conversations. Even if individuals start off being receptive, if their interaction with one another does not go well, they could easily become closed-minded again. Thus, further training in communication skills may help ensure that individuals remain open-minded during social

interaction. Furthermore, social interactions may serve to increase people's open-mindedness even further. For instance, a person may enter an interaction willing to consider another person's point of view; then, having a pleasant conversation with that other person may help them to become even more understanding and more respectful of the other person's views. Although there are myriad studies on how to improve communication generally, this section maintains a more specific focus on best practices for improving communication between individuals with divergent views.

Building Rapport. In research on communication and negotiation, building rapport is often seen as a key component for maintaining a positive environment and generating mutually beneficial outcomes. For a comprehensive review on the relationship between rapport and conflict outcomes, see Nadler (2003). A simple method for building rapport between strangers is having them engage face-to-face. In two in-lab experiments, Drolet and Morris (2000) found that participants (n = 134) who engaged face-to-face as opposed to side-by-side achieved higher joint gains during a negotiation (d = 0.34). In the second study (n = 42), they found that even when participants were separated during a conflict game, if they met face-to-face first, they were more likely to prioritize joint gains in a prisoner's dilemma task (ϕ = 0.44). Other research has found that when face-to-face contact is not possible, even engaging in "small talk" prior to an interaction can serve a similar rapport-building function. In a study of participants (Study 2, n = 120) who negotiated over email, those who had the opportunity to chat over the phone for five minutes prior to negotiations reported feeling greater rapport, and had more successful negotiation outcomes (d = 0.19, marginal significance; Morris, Nadler, Kurtzberg, & Thompson, 2002). To extend and confirm these findings, it would be useful for researchers to test whether "get to know you" exercises can be conducted via typing alone in more anonymous or impersonal settings that are representative of the majority of interactions on social media (e.g. Facebook, Twitter, Reddit, etc.), to see if these interventions might have similar efficacy.

Social psychologists have investigated this question as well. Recent work has shown that compared to typing, engaging face-to-face or via video chat facilitates higher perceptions of

humanization, greater conversation responsiveness, and lower conversation conflict (Schroeder, 2022; Lieberman & Schroeder, 2020). However, given that much discord between people with opposing views happens between anonymous strangers online, going forward it will also be important to develop interventions that can build rapport without the benefit of face-to-face interaction. In addition to manipulating rapport-building through face-to-face interactions, a growing body of literature suggests that rapport-building occurs naturally when people are given the opportunity, although people are often hesitant to put themselves in a situation where such rapport-building may occur. Studies by Epley and Schroeder (2014) find that although people think they would prefer to avoid talking to strangers on their commute, they actually have more positive experiences when they do have a conversation. Similarly, a meta-analysis of seven experiments (n_{total} = 2304) by Sandstrom and Boothby (2021) found that upon having a pleasant conversation with a stranger, participants reported feeling better about having similar interactions in the future (d ≈ 0.41 - 0.67).

Notably, important differences exist between the types of interactions in the previous studies and interactions between people with opposing views. Simply having fears about an interaction with the stranger or performing a hypothetical negotiation is different than potentially having to face threats to one's deeply-held beliefs. An online experiment by Binnquist et al. (2022), directly addresses this concern by bringing together ideological opponents to discuss topics of disagreement on Zoom. Participants (n = 122) recruited from mTurk were heavily screened and invited to a Zoom call with other participants holding opposing views. The researchers found that while participants initially reported expectations that they would dislike their conversation partner, they largely reported having an enjoyable experience and liking their partner much more than expected. These results also generalized to the entire outgroup, rather than just the conversation partner, with participants reporting more positive feelings towards their ideological outgroup after having a conversation (d = 0.49). Furthermore, changes in how favorably participants viewed the outgroup were positively correlated with greater liking of their conversation partner. Participants

who reported getting along with their opponent also were more likely to say they would be willing to have more conversations in the future.[4] Although this study did not explicitly manipulate the level of rapport built between conversationalists, these results indicate that rapport-building may happen spontaneously given the right conditions, and can lead to increases in open-mindedness. Future versions of this paradigm that vary the level of "small talk" or "icebreakers" before a potentially heated ideological conversation could shed light on how researchers can harness human's natural tendency to seek to connect with one another for the purposes of creating better dialogues and promoting open-mindedness.

Perspective-getting. To ensure effective communication, it is important that individuals accurately understand one another's point of view to avoid "talking past one another," or having misperceptions about the other's view as being threatening. As was mentioned briefly in the discussion above on perspective-taking, taking on another person's perspective does not ensure accurate understanding of that person's viewpoint (Eyal et al., 2018). One method for improving the exchange of accurate information is perspective-getting, which involves directly asking another person to explain their perspective. For instance, Eyal and colleagues (2018) found that in contrast to participants who engaged in perspective-*taking*, romantic partners who engaged in perspective-*getting* were more accurate at understanding one another's views (Study 25, n = 208, d = 0.75 - 1.85). In their study, the researchers instructed participants to ask their partner to provide their opinion on a series of specific statements, and then had participants predict their partner's responses to those statements on a 7-point scale. Participants who were told to engage in perspective-getting were more accurate than control (d = 0.75 - 1.85). Interestingly, this study found that participants who were told to perspective-take were actually *less* accurate than control (d = 0.68).

Outside of the lab, field studies that involve political canvassing suggest that perspective-getting can be effective on a large scale at reducing prejudice toward outgroup members. Kalla and

[4] Findings reported in the previous two sentences are not published in the cited paper.

Broockman (2021) conducted multiple field studies in which they employed different narrative strategies while engaging in conversations during door-to-door canvassing (see also Broockman & Kalla, 2016; Kalla & Broockman, 2020). In these studies (n = 6163), they compared perspective-taking to perspective-getting by having some participants listen to an outgroup member's experience directly - a form of perspective-getting. Other participants were asked to additionally recall something in their own experience that might serve as a parallel to the outgroup member's experience, a form of "analogic" perspective-taking. The researchers found that the intervention that only employed perspective-getting had an equivalent effect size to ones that paired perspective-getting with analogic perspective-taking. In an experimental study, they also found that a perspective-getting exercise had the strongest impact on reducing prejudiced attitudes toward immigrants and transgender people ($d \approx 0.10$). Based on these findings, they concluded that perspective-getting was the core component that made their earlier canvassing intervention effective.

Other studies have found that encouraging individuals to ask questions and to be generally curious can also be effective at facilitating positive attitudes between communication partners. First, question-asking can improve a speaker's impression of the listener/question-asker. In two experiments, one run on university students (n = 430) and another with online mTurkers (n = 338), Huang et al., (2017) found that when participants were instructed to ask at least 9 questions (versus "at most 4"), they were perceived as being more responsive and were better liked by their conversation partners (d = 0.38, 0.27). Applying this to the domain of communication between individuals with opposing viewpoints, Chen, Minson, and Tormala (2010) asked undergraduate participants (n = 56) to engage with a purported debate partner over chat. They found that participants who received a question from their debate partner (e.g., "But I was interested in what you're saying. Can you tell me more about how come you think that?") rated their partner and themselves as being more open-minded ($d_{partner} = 0.60$, $d_{self} = 0.30$). Naïve raters also judged participants in the "question" condition as behaving more receptively toward their partner in their

responses to their partner's message. Studies have also found that high quality listening (which researchers define as listening that is "empathic, attentive, and nonjudgmental") can reduce speakers' social anxiety, improve their self-awareness, reduce defensive processing, and reduce the extremity of their attitudes (Itzchakov et al., 2018; Itzchakov et al., 2017).

In addition to influencing speakers' impressions of listeners, asking questions can also affect listeners' impressions of speakers. In a second study using undergraduates (n = 49), Chen et al. (2010) found participants who were asked to generate questions in response to a message containing an opposing viewpoint reported being more favorable toward and more willing to engage with people who held that viewpoint (d = 0.30). Thus, even the process of coming up with follow-up questions can be beneficial in maintaining a positive interaction. Importantly, the researchers emphasize that when individuals ask questions, these should be *elaboration* questions. The researchers state that elaboration questions are "not asked in order to couch an argument in question form, nor to trap the other party into making a contradictory statement, but rather to gain greater understanding of the other's views." In their study, they guided participants to ask questions in this manner by telling them to ''come up with three open-ended questions for the speaker that will help you better understand why he feels as he does." Therefore, it is important to note that question-asking can be effective, but only when the right kinds of questions are asked. Furthermore, it will be important to extend these findings by observing the effect of question-asking in fully interactive contexts, rather than controlled settings with a forced listener/speaker dichotomy. Overall, question-asking (or perspective-getting) seems to be a useful tool for both facilitating the accurate exchange of information and maintaining positive relations between interaction partners, such that defensive responding is less likely to occur. Given that these last two studies have small samples, more work should be done to replicate these findings; however, encouraging question-asking in conversations between people who disagree appears to be a promising area to investigate.

Finally, before discussing perspective-giving, it would be prudent to consider the question of whether perspective-getting and giving interventions might be characterized as utilizing more

cognitive pathways in addition to being primarily a social tool. Indeed, perspective-getting interventions might take the form of a mindset intervention - seeking to put people into a "question-asking" or "information-seeking" mood before an interaction. We have chosen here to place perspective-getting (and perspective-giving in the next section) under the social pathway as they tend to act over the course of an interaction, rather than simply before one starts. However, it is important to acknowledge that these interventions should ideally draw upon both social *and* cognitive mechanisms to achieve maximum efficacy.

Perspective-giving. In concert with perspective-*getting* on the listener's side, the other important process required for promoting effective information exchange and maintaining positive attitudes is perspective-*giving* on the speaker's side, sometimes also referred to as "disclosure". Perspective-giving occurs when a speaker shares their views and feels heard and understood by the listener. Researchers also refer to this as 'narrative exchange,' particularly with regards to 'deep canvassing' (Kalla & Broockman, 2020). In two in-lab experiments (n = 123, 124), Bruneau and Saxe (2012) asked members of non-dominant groups (Mexican immigrants and Palestinians) to engage with members of dominant groups (White Americans and Israelis) through text chat and video. One partner engaged in perspective-giving, while the other listened. They found that perspective-giving led non-dominant group members to express more positive attitudes toward their interaction partners (d = 0.27, 0.32), arguing that the exercise allowed these individuals to "feel heard." Conversely, dominant group members tentatively benefited more from hearing their partners' perspectives than from perspective-giving (d = 0.33, Study 2 n.s.). Overall, these studies suggest that researchers should carefully consider contextual factors that might introduce a power imbalance between dialogue partners, and tailor interventions accordingly.

More evidence for the effectiveness of perspective-giving, which is sometimes also referred to simply as 'disclosure,' can be found in research on negotiations. Though negotiators might think it is always in their best interest to "hold their cards close to the vest," full disclosure may be more beneficial. For instance, two experiments (n = 180, 138) conducted by Thompson (1991) found that

negotiators who provided or sought information from their partner achieved better joint outcomes, and at no cost to their individual profit (d = 0.55, 0.43). However, in these studies, Thompson noted that it can be a big challenge to get negotiators to engage in this way. A slim percentage of negotiators were willing to seek or disclose information spontaneously. Informing participants that they might have different priorities also did not encourage spontaneous disclosure or information seeking. Furthermore, even some of the participants who were instructed to seek or disclose information refused to do so. This further highlights the challenge in developing interventions that can improve information seeking and disclosure behavior in the long-term, in cases where interaction partners cannot be prompted to do so.

In the context of negotiators with opposing political views, Keltner and Robinson (1993) found in two tentative in-lab experiments (n = 56, 98) that opposing partisans who fully disclosed their views prior to negotiating with one another evaluated each other more positively and were more successful in their negotiations (d = 0.35, 0.39). In comparison, participants who partially disclosed their views were no better off than participants who disclosed no information (n.s.). The researchers argue that full disclosure allows partners to become more aware of potential points of agreement and to eliminate perceptions of extreme ideological differences (i.e., reduce false polarization). Partial disclosure, on the other hand, increases suspicion that an interaction partner is 'hiding something.' Apart from improving the perceptions of the listener, disclosure might also confer benefits on the speaker, as disclosure has been found to be intrinsically rewarding for the speaker (n = 195, d ≈ 0.38; Tamir & Mitchell, 2012), and to increase the listener's liking for the speaker (d ≈ 0.32; Collins & Miller, 1994). However, these findings have not been tested in the context of interactions between individuals who know they hold opposing views, and thus, further research on the effects of disclosure on the speaker in this context is warranted. Persuading individuals to disclose in this kind of scenario might also require activities that aim at building trust between interaction partners, such that they feel comfortable disclosing.

Framing Opinions with Receptive Language. Another technique for sustaining open-mindedness during a conversation is framing one's opinion using receptive language. For instance, recent research has tested the effects of stating opinions using language that signals receptiveness (Table 2). Hussein and Tormala (2021) randomly assigned online mTurkers (n = 253) to see different kinds of phrases and examined whether they would impact people's ratings of how open-minded and receptive a speaker was. They found that readers perceived speakers to be more open-minded and more receptive when they used phrases that expressed uncertainty, acknowledged mistakes, or highlighted drawbacks (d = 0.41). Yeomans et al. (2020) took a more data-driven, bottom-up approach to identify language that can signal open-mindedness. They developed a natural language processing algorithm to determine features that most clearly distinguished between receptive and non-receptive text, and then developed an intervention in which they taught participants to use the 'receptiveness recipe' that was identified by the algorithm. The algorithm identified the following features as signaling receptiveness: using positive statements (rather than negations), acknowledging understanding of the other person's view, using hedges to soften claims, and identifying points of agreement. The researchers tested the intervention with online mTurk participants (n = 771) and found that participants who received the 'receptiveness recipe' were indeed perceived as more receptive by raters (d = 0.30). Furthermore, messages that used more first-person language were more likely to be rated as receptive, which had been found in prior studies showing that using 'I-statements' (e.g., "I feel disappointed") versus more accusatory 'you-statements' (e.g., "You disappointed me") promotes more positive feelings and more productive interactions (Simmons, Gordon, & Chambless, 2005; Kubany, Richard, Bauer, & Muraoka, 1992). Importantly, while using receptive language helps one be perceived as more open-minded, it is unclear whether it actually makes individuals more open-minded or if it merely gives them the appearance of being so. Nonetheless, future research should investigate the possibility of whether simply "faking" open-mindedness by using receptive language can create a social environment that facilitates respectful communication.

Receptiveness technique	**Example phrase**	**Source**
Expressing uncertainty	"I cannot be entirely sure, but I believe that…"	Hussein & Tormala, 2021
Acknowledging mistakes	"I used to think X, but I was wrong."	Hussein & Tormala, 2021
Highlighting drawbacks	"One of the disadvantages … is that ..."	Hussein & Tormala, 2021
Positive statements rather than negations	"X is true" or "X is good" rather than "Y is not true"	Yeomans et al., 2020
Acknowledging understanding	"I see your point" or "I understand where you are coming from"	Yeomans et al., 2020
Using hedges	"X is partly true…" or "Y is sometimes the case"	Yeomans et al., 2020
Find points of agreement	"I agree that it's a difficult situation, which is why X," rather than "That doesn't work because Y"	Yeomans et al., 2020
Using "I"-statements	"I feel disappointed" rather than "You disappointed me"	Simmons, Gordon, & Chambless, 2005

Table 2. Examples of language that can be used to signal receptiveness.

Moral Reframing. Another technique that has been tested as a way to help people with different viewpoints communicate effectively is called moral reframing (Feinberg & Willer, 2019). With this technique, people reframe their arguments about ideological issues by reframing them in a way that speaks to the other person's values. For instance, research has shown that American conservatives tend to place high value on loyalty, sanctity, and authority, while liberals disproportionately value fairness and care (Graham, Haidt, & Nosek, 2009). As such, studies have tentatively shown that conservatives become more open to pro-environmental policies when they are presented with arguments that suggest that it is their patriotic duty to protect the environment and that the environment is dirty and needs to be purified (n = 41, d = 0.29, marginal significance, Feygina et al., 2010; n = 308, b = 0.56, Study 3, Feinberg & Willer, 2013). Similarly, liberals are more open to supporting military spending when presented with arguments that the military can help to reduce income inequality and racial discrimination (n = 306, b = 0.52, Study 4, Feinberg and Willer, 2015). Although this technique has been studied more in terms of its ability to promote persuasion, it could also be a useful tool for communicating across political divides, and is worth further study.

Similar ideas have also been featured in prominent media outlets, showing its mainstream accessibility (Friedersdorf, 2018).

Interventions that Target Multiple Pathways

While we attempted to categorize interventions based upon the primary pathway that they targeted, some popular interventions are difficult to classify this way: mindfulness training, intergroup contact, and comprehensive dialogue training. These interventions can be considered "kitchen-sink" approaches — they often involve multiple components and, as a result, affect multiple pathways. Because of this, we decided to break out these interventions into their own "spotlight" section. Large bodies of literature have been dedicated to understanding their efficacy. Therefore, we will give a broad overview of the ways in which we believe they impact open-mindedness.

Mindfulness Training. In recent years, there has been a large increase in studies testing the efficacy of mindfulness (for a recent review, see Creswell, 2017). Mindfulness has been operationalized and measured in many different ways (Quaglia et al., 2015). A common definition, provided by Kabat-Zinn (2003), refers to mindfulness as "paying attention in a particular way: on purpose, in the present moment, and non-judgmentally." Most researchers consider mindfulness as aiming to cultivate two primary outcomes: (1) increased present-moment attention and awareness and (2) an open, accepting, and non-judgmental attitude. One large-scale study called the ReSource Project (n = 332, Singer & Engert 2019) found that mindfulness focusing on bodily awareness was effective at improving participants' self-reported ability to observe, be present, and not react, but did not impact their ability to adopt a non-judgmental mindset. Alternatively, mindfulness focusing on boosting meta-cognitive and perspective-taking skills improved acceptance of alternative beliefs, and mindfulness focusing on cultivating prosocial emotions and regulating difficult emotions improved the ability to be non-judgmental. These trainings appear to utilize all of the psychological

mechanisms included in our conceptual model, including cognitive, affective, motivational, and social processes.

In the most direct test of the effects of mindfulness on receptivity to those with opposing views, Alkoby et al. (2017) investigated the efficacy of a general-purpose, well-established eight-week mindfulness program called "mindfulness-based stress reduction" (Kabat-Zinn, 1990). Israeli Jews (n = 88) were assigned to the mindfulness condition or to a control (i.e., no intervention). At the conclusion of the mindfulness program, a subset of participants from each condition also received training in cognitive reappraisal. All participants then watched a video in which an Israeli-Palestinian politician gave a "harsh speech against the Israeli government's actions." The researchers found that, compared to the control condition, all three experimental conditions (mindfulness, reappraisal, and their combination) effectively reduced negative emotional responding, reduced perceived threat, and increased support for compromise (d= 0.24).

Overall, testing the efficacy of mindfulness interventions with regard to relations between individuals with opposing views is new territory. In addition to testing its efficacy in this context generally, it would be useful to test the efficacy of mindfulness training programs of different lengths to determine proper "dosage." Is it necessary to conduct a several-session training course, or can a brief intervention suffice? In addition, it will be important to understand the long-term effects of open-mindedness interventions. Finally, many studies on mindfulness have been conducted in populations who are motivated to use the treatment to improve their own well-being. This means that intervention samples in open-mindedness studies are often self-selected. In order to develop interventions that can be used and accepted widely, it may be useful to develop mindfulness interventions that consider how to best serve individuals who might be resistant to them.

Intergroup Contact. Decades of research have also examined the beneficial effects of intergroup contact on reducing prejudice (Allport, 1954). For theoretical and meta-analytic reviews of the effects of intergroup contact, see Pettigrew (1998); Pettigrew & Tropp (2006); and Pettigrew et al. (2011). Studies of contact theory tend to focus on reducing prejudice between members of

racial and ethnic groups; however, we propose that intergroup contact operates on both affective and cognitive mechanisms related to open-mindedness. In particular, Dovidio, Gaertner, and Kawakami (2003) suggest that intergroup contact is effective because it reduces anxiety and alters social categorizations.

Some researchers have argued that intergroup contact can operate as a sort of 'exposure therapy' in reducing people's negative affect in response to outgroup members (Birtel & Crisp, 2012). In a meta-analytic review of 515 studies spanning over 250,000 participants, Pettigrew and Tropp (2011) found that the association between intergroup contact and prejudice reduction ($r = -0.21$) was mediated by reductions in threat and anxiety responses during interactions between members from opposing groups. In one correlational finding included in the review, Blascovich et al. (2001) report that Whites ($n = 58$) who had more contact with members of other racial and ethnic groups showed lower physiological markers of stress and reported lower levels of anxiety during an interaction with an outgroup member compared to those who had less contact (adjusted $R^2 = 0.17$). Pettigrew and Tropp also found that perspective-taking/empathy was a significant mediator. Other studies have found that even imagined contact can potentially improve people's attributions and emotions about stigmatized groups and people with opposing views (Warner & Villamil, 2017; Birtel & Crisp, 2012).

Intergroup contact can also operate on cognitive pathways by leading to the formation of new group identities. In particular, it can help to personalize members of the outgroup and also correct inaccurate meta-perceptions about what those outgroup members are really like. According to social identity theory, people naturally group concepts into categories, which underlies people's tendency to categorize people into an ingroup versus an outgroup (Turner et al., 1987; Stets & Burke, 2000). Researchers who advocate for the common ingroup identity model suggest that changing how people make social categorizations can be effective at reducing intergroup bias (Gaertner & Dovidio, 2014).

For example, Gaertner et al. (2000) reanalyzed data from the classic social psychology experiment called the Robbers Cave, in which boys at a summer camp formed two social groups that were in conflict who then improved their relationships with one another through intergroup contact (Sherif, 1961). Based on their analysis and other experimental findings from their laboratory, they proposed that Sherif was effective at reducing intergroup conflict between the two groups because of strategies he employed that led to "decategorization, recategorization, and mutual differentiation processes." Decategorization (or personalization) involves seeing a member of an outgroup as an individual rather than a group member. Recategorization involves focusing on a superordinate identity, or some other shared group membership, such that the outgroup member is reclassified as an ingroup member. And mutual differentiation involves having group members emphasize their group differences as a benefit to their mutual collaboration. Therefore, intergroup contact can help to either lead to depersonalization or facilitate the creation of a shared identity/superordinate goals, both of which can help to reduce prejudice.

It is important to note that there are boundary conditions on the effects of intergroup contact. For instance, some research has also found that intergroup contact can promote rather than alleviate anxiety, demonstrated tentatively in an experiment ($n = 140$) where white participants were told they should be concerned about appearing prejudiced in an interaction with a black participant ($d = 0.21$, marginal significance, Shelton, 2003). Instances of negative contact can have adverse effects through making group membership more salient (Paolini, Harwood, & Rubin, 2010). Since the advent of contact theory, researchers have noted that certain conditions are required in order for contact theory to be successful, including equal status, common goals, cooperative interdependence, support from norms and/or authorities, opportunity for personal acquaintance, and the development of intergroup friendships (Allport, 1954; Dovidio, Gaertner, and Kawakami, 2003). Therefore, intergroup contact must be administered carefully. Further research is needed to determine how effective it is in contexts involving people with different ideological viewpoints, and whether it requires additional prerequisites in order to be successful.

Comprehensive Dialogue Training. The majority of interventions in this section focus on testing the effects of explicit instructions directly prior to interaction. However, few of them incorporate repeated interactions between individuals with opposing views, which may serve as a training ground to improve interactions in the long term. Research on the efficacy of practicing dialogue is limited, though in recent years, psychologists have been moving toward developing such interventions. For instance, Influs et al. (2019) developed the intervention "Tools of Dialogue" to reduce tension between Israeli and Palestinian adolescents. In this intervention (n = 88), Israelis and Palestinians engaged in an 8-session series. Each session contained an introduction to a specific topic (e.g., empathy, prejudice…), activities and games that would promote synchronous behavior, and opportunities for one-on-one and group dialogue. The researchers obtained a large battery of pre- and post-intervention measures, including recorded dialogues, saliva samples, and individual interviews. Thus far, results show that the intervention increased perspective-taking (V = 0.24), which was operationalized as whether or not participants perceived that the "conflict is complicated and that there is justice on both sides of the conflict." Overall, this intervention provided opportunities for participants to learn effective communication techniques and to practice them in a guided setting. However, the intervention program also involved repeated exposure to members of the opposing group, learning about alternative viewpoints, learning about cognitive biases, and participating in synchronous activity. Thus, it becomes very difficult to tease apart mechanisms, and to determine whether or not the dialogue component was effective at improving perspective-taking and stress responses. Future work is needed to determine whether training in communication skills and repeated, supervised practice can be effective at improving interactions between individuals with opposing views.

Another recent study by researchers at OpenMind (Welker et al., 2023) created an asynchronous online educational program called Perspectives. This program consisted of a long-form intervention where participants recruited from both college student and government finance officer samples were taught about cognitive biases and practiced dialogue skills with peers. Over three

studies where the program was implemented in various settings, ranging from college classes to government agencies, participants (n = 35209, 341, 450) completed 5-8 half-hour modules and were given the option to have four 45-minute peer-to-peer conversations with another individual completing the program. Participants were found to have small to medium-sized decreases in affective polarization (d = 0.41, 0.36, 0.67), as well as small to medium-sized increases in intellectual humility. Furthermore, participating in the Perspectives program led to small improvements in conflict resolution skills. These effects were found to persist 8 weeks after the intervention finished (d = 0.27).

Discussion

In this review, we have attempted to provide a comprehensive overview of interventions that have been used to promote or sustain open-mindedness. We outlined a conceptual model that can be used to understand the different psychological pathways on which these interventions operate. We organized these interventions according to the psychological pathway on which they had the most direct impact. Where possible, we included studies that tested the effects of interventions directly on improving attitudes towards and/or relations between individuals who hold opposing views; however, many interventions have not yet been tested directly in this domain.

Summary of Current Evidence

In reviewing a broad range of literature across multiple academic fields, we identified four main psychological pathways that open-mindedness interventions can target. First, we reviewed interventions that have aimed to alter cognitive processes using either direct or more domain-general methods. Second, we identified research programs that have induced open-mindedness through motivational pathways, whereby the goal is to promote accuracy goals, satisfy the need for self-integrity, or leverage the need to belong. Third, we discussed how emotion regulation training can help individuals remain open-minded when they encounter viewpoints that may give rise to negative affect during social interactions. Finally, we explored how interventions that teach social

skills can also help to maintain and build the open-mindedness of an individual and their interaction partner.

Overall, research on the efficacy of open-mindedness interventions is still underexplored. Further evidence is required to determine which interventions are most effective on their own and in combination with one another. To our knowledge, this review is the first attempt to consolidate research on open-mindedness interventions across multiple fields. In Table 3, we provide a list of the intervention types included in this review. In addition, for each intervention type, we include descriptions about the size and strength of evidence that has been found to support its efficacy, how much effort is required to administer it, and examples of studies that have investigated it. Size of literature was classified based on the number of independent studies finding the intervention to be effective, taking into account if any broader literature reviews of that domain exist as well as the size and quality of the relevant studies. Interventions with many high quality studies spanning multiple research groups were classified as “large”, whereas interventions with only a few studies or multiple studies conducted by a single research group were classified as “small” or “medium”. Similarly, the overall evidence supporting each intervention’s effectiveness was characterized as either “Strong”, “Moderate”, “Tentative”, or “Mixed”. This was determined by a holistic assessment of the quality of the studies of each intervention, taking into account the methodology, sample sizes, and effect sizes. Additionally, where applicable, we detail potential boundary conditions determining interventions’ effectiveness. A more comprehensive overview of the studies included throughout this review, detailing methodology, sample size, effect size, and the overall quality of evidence for each study is provided in Table S1 of the Supplemental Materials for researchers’ reference.

Intervention technique	**Size of literature relevant to open-mindedness**	**Evidence supporting efficacy as an open-mindedness intervention**	**Required effort to administer**	**Relevant Examples**

Cognitive (targeted)				
Teaching about biases	Large	Strong – may be counterproductive if feel threatened	Variable	Nasie et al. (2014), Morewedge et al. (2015)
Changing implicit theories/mindsets (e.g. growth mindset)	Medium (though overall literature is large)	Tentative – some null effects, overall literature reports mixed findings	Low	Porter et al. (2020), Weisz et al. (2020)
Perspective-taking	Large	Strong – most effective when held accountable for accuracy	Low	Todd & Galinsky (2014), Tuller et al. (2015)
Paradoxical thinking	Small	Tentative – most effective when targeting extreme beliefs	Low	Hameiri et al. (2018), Hameiri et al. (2020)
Puncturing the illusion of explanatory depth	Medium	Mixed - some failures to replicate	Low	Jonhson et al. (2016), Crawford & Ruscio (2021)
Correcting false meta-perceptions	Medium	Strong	Low	Lees and Cikara (2020), Ruggeri et al. (2021)
Cognitive (domain-general)				
Cognitive disfluency	Small	Tentative	Low	Yang et al. (2013), Hernandez and Preston (2013)
Self-distancing	Medium	Strong	Low	Kross & Grossmann (2012), Grossmann et al. (2021)
Positive mood inductions	Small (though overall literature is large)	Mixed - more research is needed – current work is speculative	Low	Nelson (2009), Park and Banaji (2000)

Cognitive training	Small	Mixed - more research is needed – current work is speculative	High	Carpenter et al. (2019), Glass et al. (2013)
Psychedelics	Small	Tentative, but promising	High	Lyons & Carhart-Harris (2018), Roseman et al. (2021)
Motivational				
Promoting accuracy motives	Large	Strong with monetary incentives, more tentatively for mere priming of accuracy	Low	Lerner & Tetlock (1999), Bullock et al. (2013)
Satisfying the Need for Self-Integrity (Self-Affirmation)	Large	Mixed - some failures to replicate, may only be effective when partisan identity is salient	Low	Cohen et al. (2000), Ward et al. (2011)
Leveraging the Need to Belong	Small (though overall literature is large)	Tentative – more research is needed	Low	Chen et al. (1996), Baumeister et al. (2002)
Affective				
Cognitive reappraisal	Medium (though overall literature is large)	Strong – may require motivation to regulate emotion	Variable	Porat et al. (2020), Tamir et al. (2019)
Indirect emotion regulation	Small	Not enough research to date	Low	Halperin et al. (2011), Halperin et al. (2014)
Encouraging emodiversity	Small	Mixed - more research is needed	More research needed	Grossmann et al. (2020), Quoidbach et al. (2014)
Social				

Building rapport	Small (though overall literature is large)	Strong	Variable	Drolet & Morris (2000), Binnquist et al. (2022)
Perspective-getting	Large	Strong	Variable	Kalla & Broockman (2021), Huang et al. (2017)
Perspective-giving	Medium (though overall literature is large)	Strong, but may depend on group identity and power dynamics	Variable	Bruneau et al. (2012), Thompson (1991)
Framing opinions with receptive language	Small	Moderate	Low	Hussein & Tormala (2021), Yeomans et al. (2020), Simmons, Gordon, & Chambless (2005)
Moral reframing	Small	Moderate	Low	Feinberg & Willer (2019), Feinberg & Willer (2013)
Multiple				
Mindfulness training	Small (though overall literature is large)	Moderate – outcomes likely depend on certain subtypes of mindfulness	High	Creswell (2017), Alkoby et al. (2017)
Intergroup contact	Large	Strong – outcomes may depend on the context of intergroup contact, not all contact may be beneficial	High	Pettigrew & Tropp (2011), Allport (1954)
Comprehensive dialogue training	Moderate	Strong	High	Influs et al. (2019), Welker et al. (2023)

Table 3. List of intervention techniques included in this review along with ratings that describe the amount and extent to which evidence supports each technique, and the effort required to implement each technique.

This table can be used as a reference by researchers and interventionists to understand the current state of the literature and prompt them to consider whether an intervention might work in a certain context. For instance, studies have found that some interventions are effective only when certain boundary conditions, such as personality characteristics or social contexts, are present. Others have failed to replicate in recent work. Furthermore, some interventions appear to have potential based on existing correlational data, but have limited data to support their efficacy, or have yet to be tested. Although this table can provide preliminary guidance, it does not contain information regarding effect sizes (i.e. the impact that can be achieved by the intervention) or the longevity of the intervention's effect (see Table S1 in the Supplemental Materials for a more comprehensive overview of the reviewed studies and interventions). In the future, we hope that further research will enable the creation of an even more all-inclusive 'menu of options' from which researchers and practitioners can select the most appropriate interventions.

Recommendations and Best Practices

Currently, there are barriers that make it difficult to create such a comprehensive list with clear recommendations. If we were planning a study tomorrow, a few of the interventions we would have the most confidence in are teaching about biases, promoting accuracy motives, and perspective-getting. These three interventions standout as having shown moderate to large effects over multiple studies as well as being fairly easy to implement. That being said, more research is needed in order to better understand the efficacy and nuances of each intervention type as well as moderators and boundary conditions that may limit their effectiveness in different contexts. Some interventions are backed by large literatures that support their efficacy in general (e.g. cognitive reappraisal, leveraging the need to belong, and mindfulness), but have less evidence to support their ability to promote open-mindedness specifically. Other interventions have been developed more recently and tested in few studies, if any (e.g. framing opinions with receptive language, cognitive disfluency, and encouraging emodiversity). Among those interventions that have received less

attention (i.e. fewer studies), the ones that seem to show the most promise and warrant additional research are paradoxical thinking, psychedelics, and building rapport.

Additionally, the measures used to assess open-mindedness vary widely across studies. Many studies assess open-mindedness using multiple non-validated measures that are tailored to a particular context. Although the creation of such 'bespoke' measures allows for specificity with regards to particular social and political issues or groups, these state- and context-dependent measures pose challenges for comparing across studies and compiling effect sizes. Even though it is possible to compare effect sizes across studies, it is a bit like comparing apples and oranges when dependent variables represent such different constructs (from attitudes about other groups, to empathic accuracy, to behavioral measures that are captured during a conversation). Some of these measures may be noisier, and thus inherently less powerful, such that their effect sizes could be smaller even if the interventions they assess are in fact powerful. (See Supplemental Table S2 for an overview of measures that have been used to assess open-mindedness.)

Thus, it may be beneficial for researchers to develop a more standardized set of open-mindedness stimuli and measures, and also to refer to the construct of open-minded thinking and behavior using more consistent terminology. Ideally, a task would be created that provides an opportunity for open-mindedness and a set of measures to assess its occurrence. Then a variety of interventions could all be tested with this same task allowing researchers to truly compare the efficacy of different interventions or how they interact with one another when stacked together in a multi-part intervention. For an example of a study that tests many interventions on the related topic of partisan animosity, see Voelkel et al. (In Press).

Moving forward, best practices for researchers studying open-mindedness may be to include taking multiple kinds of open-mindedness measures, including more trait-like personality measures of open-mindedness (e.g. more similar to openness to experience measures), as well as state-like context dependent measures (e.g. specific feelings towards certain issues, people, and situations). The most robust studies should obtain a measure of a person's trait- and state- open-mindedness

before and after an intervention, ideally over a broad range of contexts in order to get a holistic view of how an intervention can shift open-mindedness across different situations and topics. As the literature grows and uses a more consistent set of validated measures, it will become possible to conduct meta-analyses that can provide further insight into which interventions have the strongest effects. Furthermore, researchers studying open-mindedness should take care to adhere to modern standards of statistical rigor - especially when developing new interventions or investigating underexplored techniques. This may include things like pre-registration and using a-priori power analyses to determine sufficient sample size, as well as acknowledging limitations studies may face and running replications when appropriate (Lakens 2022).

Another recommendation would be to look beyond the lab for additional interventions. Many, but not all, of the interventions reviewed here were already psychological interventions used for other purposes (e.g. self-affirmation) and were ported into the study of open-mindedness. There are a lot of people and groups in the 'real world' talking about how to reduce bias in their thinking and become more open-minded, some of which explore ideas not yet tested formally in experimental settings (i.e. LessWrong.com, Center for Applied Rationality). It would behoove scientists interested in this topic to consider these sources. One such idea that is often discussed in these communities is encouraging people to think like a scout or take a 'scout mindset', focusing on gathering information, assessing possibilities, and observing what ideas and perspectives are out there with as much objectivity as possible (Galef, 2021). This is pitted in contrast to a 'soldier mindset', which focuses on defending and attacking arguments and is more easily biased by motivated reasoning. The core idea behind a potential scout mindset intervention does not look all that different from other 'teaching about bias' interventions; however, incorporating a level of narrativization and story-telling, such as by using the 'scout vs soldier' metaphor, may increase how receptive participants are to using such a mindset.

In our lab, we have run an exploratory study testing this idea, comparing a scout mindset intervention against a self-affirmation intervention and a no-intervention control (Dolbier &

Lieberman, 2023). In this online pilot study (n = 198) with a standardized task, participants who were taught about the scout mindset before watching a video of someone expressing an opinion on a controversial opinion they disagreed with expressed more positive feelings towards the speaker than people who did a self-affirmation intervention (d = 0.40) or no intervention (d = 0.58). This is only one tentative online study that needs following up on, but it hints at the value of looking beyond the ivory tower for other approaches. Researchers might draw inspiration from sources like these to better understand how interventions in the lab might be adapted for everyday contexts and interactions.

Future Directions

Given the nascency of research on open-mindedness interventions, there are many opportunities for future research. First, researchers can consider developing novel techniques for measuring open-mindedness. Most open-mindedness studies rely on self-report, which can be biased by demand characteristics, perceived social desirability, and a lack of introspective ability. Measurement error poses a problem for comparing effect sizes between intervention types and also for concluding that certain interventions that yield null effects are truly ineffective. Thus, further work is needed to develop open-mindedness measures that are both precise and accurate. Recent research in this domain has been promising. For instance, studies have shown that portable neuroimaging techniques such as fNIRS and EEG can be used to study individuals interacting within dyads and even larger groups (Dikker et al., 2017; Burns, 2020). Increases in the accessibility and adoption of online text-based and video chatting have also made it more feasible to bring people with different viewpoints together to have conversations for research purposes (Binnquist, Dolbier, Dieffenbach, & Lieberman, 2022). In tandem, researchers have developed more sophisticated yet accessible techniques for analyzing rich conversational datasets, including natural language processing (NLP) models and tools to analyze facial expressions (Yeomans et al., 2020; Cheong et al., 2021). Therefore, researchers now have the tools to measure the impact of open-mindedness

interventions on behavior and the brain, which can help to address the limitations of self-report, especially in this particular field.

Simultaneously, given the large number of bridge-building associations (e.g. AllSides, BridgeUSA, One America Movement, The Flip Side, etc.) in the United States and around the world, there are many opportunities for researchers to team up with practitioners to better understand the impact of their interventions on real-world outcomes. In their review of prejudice reduction interventions, Paluck et al. (2020) discuss the benefits and practicality of conducting field studies. They suggest working with partners who are already conducting interventions, as this allows researchers to test ideas that have already been feasibly implemented in an applied setting. Furthermore, they recommend designing intervention-based research by optimizing for settings that allow researchers to measure certain behavioral or real-world outcomes. Researchers have also found creative methods for measuring the broader impact of being open-minded. For instance, Minson et al. (2018) found that when two people are both receptive to one another's views, the social networks that they belong to become less homogenous.

Another recent trend in terms of the development of interventions has been examining what 'dosage' is required to create interventions that are maximally impactful and long-lasting, but also feasible to administer at scale. Researchers have found that even brief, light-touch interventions in other domains can have large, long-term effects (Yeager & Walton, 2011). They argue that these interventions work because they focus on making small changes to subjective meaning-making — "the working hypotheses people draw about themselves, other people, and social situations" — that can have transformational effects (Walton & Wilson, 2018). Furthermore, they argue that these changes are highly context-specific and can be especially powerful when conducted in contexts like schools or companies that can help to reinforce change. For this reason, Walton (2014) has coined the term 'wise interventions' to describe these light-touch techniques due to the fact that they are precise in terms of the psychological mechanisms that they target and that they are maximally

impactful. It may also be beneficial to explore the extent to which interventions require reinforcement through repeated 'boosters' over time.

Another domain that should be explored is the potential for individual trait differences to moderate the effectiveness of open-mindedness interventions. Some of the research reviewed in this manuscript seems to suggest this is a possibility, with some interventions' effects being limited to subsets of participants with particularly strong convictions (Nasie et al., 2014; Hameiri et al., 2018; Hameiri et al., 2020; Cohen et al., 2007) or specific identities (Levy, 2017; Binning et al., 2015; Shelton, 2003). Researchers might find success including baseline trait measures (e.g. openness to experience) and examining whether individual differences in these domains impact how well an intervention is received. It may be, for instance, that individuals who are already high in constructs related to open-mindedness (e.g. openness, intellectual humility, etc.) do not get much benefit from a typical "bias-reducing" intervention, whereas individuals with low baselines in these traits show noticeable improvements.

Furthermore, perhaps one of the most promising areas for future research is the possibility that simpler, "single-pathway" interventions might be combined in a sort of 'kitchen-sink approach', integrating multiple interventions together to create a more effective whole. Little research has directly compared the effects of interventions that are administered in combination versus alone. Building upon this idea, while this manuscript has discussed some "multi-pathway" interventions, such as mindfulness, intergroup contact, and comprehensive dialogue training, these interventions notably all require high amounts of effort to implement in an experimental setting, making them not only difficult to study with controlled research, but limiting their ease of implementation in society. If "single-pathway" interventions can be applied in a stepwise fashion in the lab, researchers might be able to draw upon the strengths of one pathway to fill in the weaknesses of another. For instance, people with salient identities may be resistant to typical bias-reducing interventions due to feeling threatened (Levy, 2017); however, this might be mitigated by first applying a motivational shift, such as self-affirmation or promoting accuracy, and *then* teaching about bias, potentially

alleviating the feelings of threat. This might then be followed up with a perspective-getting exercise where participants are asked to think of questions they might ask an outgroup member as they watch a video of them expressing beliefs they disagree with, building upon and sustaining the open mindset created by the first two interventions. It is likely that the *most* effective interventions to improve open-mindedness will draw upon multiple techniques and pathways, synthesizing a sort of "mega-intervention" by filling in the weakness of one intervention with the strengths of another.

Finally, it may also be possible to design larger scope, societal-wide interventions to target the larger structural framework that open-mindedness exists within. One strategy that has been proposed for influencing norms is targeting social referents — whereby interventions are strategically administered to individuals who are the most influential in their social networks (see Paluck et al., 2016). Another strategy involves weakening the grip of certain social norms by educating people with regards to the inaccuracies in their beliefs about group norms (i.e., correcting pluralistic ignorance). In addition, there are likely to be several relevant strategies that aim to alter social structures in order to promote open-minded behavior. For instance, the design of social media platforms may influence the extent to which people engage in open-minded discussions with one another (e.g. maximum word counts on posts, the presence of like/dislike buttons, algorithms that determine what content is shown to users, etc.) Beyond social media, the incentives that are embedded in institutions such as in the workplace or higher education can also be powerful drivers of behavior. Organizations may consider how they can realign their incentive structures with aims to promote open-minded thinking and dialogue. Scholars in fields such as cultural psychology, anthropology, sociology, political science, organizational behavior, and group dynamics may be able to offer further insight into best practices for developing interventions that target those broader societal factors (see Blankenship et al., 2006; Bolman & Deal, 2017; Carnall, 2007; Hernández-Mogollon et al., 2010; Nielsen & Abildgaard, 2013; Schein, 1990; Shapiro, 2006; Steward, 1972; Tankard & Paluck, 2016; Valente, 2012).

In conclusion, we believe that there are many open questions remaining as to the individual mechanisms and group-level forces that cause people to be open- or closed-minded. We argue that there is a fertile field for research in terms of understanding what an open mind 'looks like,' how to measure it, how to induce it, and how to sustain it. We hope that this review can serve as a helpful starting point for researchers in both basic and applied settings to develop more impactful interventions. In the long-term, such interventions may be able to address the rising affective polarization that has been seen in America and around the world. While it is unrealistic to expect that people will come to agree on everything, the research reviewed in this paper suggests that it is possible for people to learn to embrace a diversity of viewpoints and respect those who disagree with them.

References

Alkoby, A., Halperin, E., Tarrasch, R., & Levit-Binnun, N. (2017). Increased support for political compromise in the Israeli-Palestinian conflict following an 8-week mindfulness workshop. *Mindfulness,* 8, 1345-1353.

Allport, G. W. (1954). The nature of prejudice. Cambridge, MA: Perseus Books

Alter, A. L., Oppenheimer, D. M., Epley, N., & Eyre, R. N. (2007). Overcoming intuition: Metacognitive difficulty activates analytic reasoning. *Journal of Experimental Psychology: General*, *136*(4), 569–576. https://doi.org/10.1037/0096-3445.136.4.569

Baehr, J. (2011). The Structure of Open-Mindedness. *Canadian Journal of Philosophy, 41*:2, 191-213, DOI: 10.1353/cjp.2011.0010

Batson, C. D., Polycarpou, M. P., Harmon-Jones, E., Imhoff, H. J., Mitchener, E. C., Bednar, L. L., ... & Highberger, L. (1997). Empathy and attitudes: Can feeling for a member of a stigmatized group improve feelings toward the group?. *Journal of personality and social psychology*, *72*(1), 105.

Baumeister, R. F., & Leary, M. R. (1997). Writing narrative literature reviews. *Review of General Psychology*, *1*(3), 311-320.

Baumeister, R. F., & Leary, M. R. (2017). The need to belong: Desire for interpersonal attachments as a fundamental human motivation. *Interpersonal development*, 57-89.

Baumeister, R. F., Twenge, J. M., & Nuss, C. K. (2002). Effects of social exclusion on cognitive processes: anticipated aloneness reduces intelligent thought. Journal of personality and social psychology, 83(4), 817.

Berlin, I. (2001). My intellectual path. In H. Hardy (Ed.), The power of ideas (pp. 1–23). Princeton, NJ: Princeton University Press

Binning, K. R., Brick, C., Cohen, G. L., & Sherman, D. K. (2015). Going along versus getting it right: The role of self-integrity in political conformity. *Journal of Experimental Social Psychology*, *56*, 73-88.

Binnquist, A. L., Dolbier, S. Y., Dieffenbach, M. C., & Lieberman, M. D. (2022). The Zoom solution: Promoting effective cross-ideological communication online. *Plos one*, *17*(7), e0270355.

Birtel, M. D., & Crisp, R. J. (2012). "Treating" prejudice: An exposure-therapy approach to reducing negative reactions toward stigmatized groups. *Psychological science*, *23*(11), 1379-1386.

Bishop, B. (2008). *The Big Sort: Why the Clustering of Liked-Minded America is Tearing Us Apart*. Boston: Houghton-Mifflin.

Blankenship, K. M., Friedman, S. R., Dworkin, S., & Mantell, J. E. (2006). Structural interventions: concepts, challenges and opportunities for research. *Journal of Urban Health, 83*(1), 59-72.

Blascovich, J., Mendes, W. B., Hunter, S. B., Lickel, B., & Kowai-Bell, N. (2001). Perceiver threat in social interactions with stigmatized others. *Journal of personality and social psychology*, *80*(2), 253.

Bolman, L. G., & Deal, T. E. (2017). *Reframing organizations.* San Francisco, CA: Jossey-Bass.

Bridging Map. (May, 2021). *Princeton University Bridging Divides Initiative.* *https://bridgingdivides.princeton.edu/bridging-map/map*

Broockman, D., & Kalla, J. (2016). Durably reducing transphobia: A field experiment on door-to-door canvassing. *Science*, *352*(6282), 220-224.

Bruneau, E. G., & Saxe, R. (2012). The power of being heard: The benefits of 'perspective-giving' in the context of intergroup conflict. *Journal of Experimental Social Psychology*, *48*(4), 855–866. https://doi.org/10.1016/j.jesp.2012.02.017

Bullock, J. G., Gerber, A. S., Hill, S. J., & Huber, G. A. (2013). *Partisan bias in factual beliefs about politics* (No. w19080). National Bureau of Economic Research.

Burnette, J. L., Billingsley, J., Banks, G. C., Knouse, L. E., Hoyt, C. L., Pollack, J. M., & Simon, S. (2023). A systematic review and meta-analysis of growth mindset interventions: For whom, how, and why might such interventions work?. Psychological Bulletin, 149(3-4), 174.

Burns, S. (2020). Neural and Psychological Coordination in Social Communication and Interaction. University of California, Los Angeles.

Carhart-Harris, R. L., & Friston, K. (2019). REBUS and the anarchic brain: toward a unified model of the brain action of psychedelics. Pharmacological reviews, 71(3), 316-344.

Carnall, C. A. (2007). *Managing change in organizations.* Pearson Education.

Carpenter, J., Sherman, M. T., Kievit, R. A., Seth, A. K., Lau, H., & Fleming, S. M. (2019). Domain-general enhancements of metacognitive ability through adaptive training. *Journal of Experimental Psychology: General*, *148*(1), 51.

Catapano, R., Tormala, Z. L., & Rucker, D. D. (2019). Perspective Taking and Self-Persuasion: Why "Putting Yourself in Their Shoes" Reduces Openness to Attitude Change. *Psychological Science*, *30*(3), 424-435.

Čehajić-Clancy, S., Goldenberg, A., Gross, J. J., & Halperin, E. (2016). Social-psychological interventions for intergroup reconciliation: An emotion regulation perspective. *Psychological Inquiry*, *27*(2), 73-88.

Chen, F. S., Minson, J. A., & Tormala, Z. L. (2010). Tell me more: The effects of expressed interest on receptiveness during dialog. *Journal of Experimental Social Psychology*, *46*(5), 850-853.

Chen, S., Shechter, D., & Chaiken, S. (1996). Getting at the truth or getting along: Accuracy- versus impression-motivated heuristic and systematic processing. *Journal of Personality and Social Psychology, 71*(2), 262–275. https://doi.org/10.1037/0022-3514.71.2.262

Cheong, J., Kalkan, S., & Gunes, H. (2021). The hitchhiker's guide to bias and fairness in facial affective signal processing: Overview and techniques. *IEEE Signal Processing Magazine*, *38*(6), 39-49.

Christensen, A. P., Cotter, K. N., & Silvia, P. J. (2019). Reopening openness to experience: A network analysis of four openness to experience inventories. *Journal of personality assessment*, 101(6), 574-588.

Cinelli, M., Morales, G. D. F., Galeazzi, A., Quattrociocchi, W., & Starnini, M. (2021). The echo chamber effect on social media. *Proceedings of the National Academy of Sciences*, *118*(9).

Cohen, G. L., Aronson, J., & Steele, C. M. (2000). When beliefs yield to evidence: reducing biased evaluation by affirming the self. *Personality and Social Psychology Bulletin*, *26*(9), 1151–1164. https://doi.org/10.1177/01461672002611011

Cohen, G. L., Sherman, D. K., Bastardi, A., Hsu, L., McGoey, M., & Ross, L. (2007). Bridging the partisan divide: Self-affirmation reduces ideological closed-mindedness and inflexibility in negotiation. *Journal of Personality and Social Psychology*, *93*(3), 415–430. https://doi.org/10.1037/0022-3514.93.3.415

Cohen-Chen, S., Halperin, E., Crisp, R. J., & Gross, J. J. (2014). Hope in the Middle East: Malleability beliefs, hope, and the willingness to compromise for peace. *Social Psychological and Personality Science*, *5*(1), 67-75.

Collins, N. L., & Miller, L. C. (1994). Self-disclosure and liking: a meta-analytic review. *Psychological Bulletin*, *116*(3), 457.

Crawford, J. T., & Ruscio, J. (2021). Asking People to Explain Complex Policies Does Not Increase Political Moderation: Three Preregistered Failures to Closely Replicate Fernbach, Rogers, Fox, and Sloman's (2013) Findings. *Psychological Science*, *32*(4), 611-621

Creswell, J. D. (2017). Mindfulness Interventions. *Annual Review of Psychology*, *68*(1), 491–516. https://doi.org/10.1146/annurev-psych-042716-051139

Davis, M. H., Conklin, L., Smith, A., & Luce, C. (1996). Effect of perspective taking on the cognitive representation of persons: A merging of self and other. *Journal of Personality and Social Psychology*, *70*(4), 713–726. https://doi.org/10.1037/0022-3514.70.4.713

DeYoung, C. G., Grazioplene, R. G., & Peterson, J. B. (2012). From madness to genius: The Openness/Intellect trait domain as a paradoxical simplex. *Journal of Research in Personality*, 46(1), 63–78. doi:10.1016/j.jrp.2011.12.003

Dieffenbach, M. C., Gillespie, G. S., Burns, S. M., McCulloh, I. A., Ames, D. L., Dagher, M. M., ... & Lieberman, M. D. (2021). Neural reference groups: a synchrony-based classification

approach for predicting attitudes using fNIRS. *Social Cognitive and Affective Neuroscience*, *16*(1-2), 117-128.

Dieffenbach, M., & Lieberman, M. D. (2023, Preprint). Belief Bubbles: How Latitudes of Acceptance Shape Social Decisions. Retrieved from psyarxiv.com/zygks

Dieffenbach, M. C., Burns, S., Li, J., Ames, D. L., Lieberman, M. D. (in prep). Leveraging Differences to Bring People Together: Using Neural Synchrony to Detect Polarized Thinking and Evaluate Open-Mindedness Interventions

Dikker, S., Wan, L., Davidesco, I., Kaggen, L., Oostrik, M., McClintock, J., ... & Poeppel, D. (2017). Brain-to-brain synchrony tracks real-world dynamic group interactions in the classroom. *Current biology*, *27*(9), 1375-1380.

Dolbier, S. Y., & Lieberman, M. D. (2023). Testing Multiple Open-mindedness Interventions. [Unpublished manuscript]. University of California Los Angeles.

Dovidio, J. F., Gaertner, S. L., & Kawakami, K. (2003). Intergroup contact: The past, present, and the future. *Group processes & intergroup relations*, *6*(1), 5-21.

Dovidio, J. F., Johnson, J. D., Gaertner, S. L., Pearson, A. R., Saguy, T., & Ashburn-Nardo, L. (2010). Empathy and intergroup relations. In M. Mikulincer & P. R. Shaver (Eds.), *Prosocial motives, emotions, and behavior: The better angels of our nature.* (pp. 393–408). https://doi.org/10.1037/12061-020

Drolet, A. L., & Morris, M. W. (2000). Rapport in conflict resolution: Accounting for how face-to-face contact fosters mutual cooperation in mixed-motive conflicts. *Journal of Experimental Social Psychology*, *36*(1), 26-50.

Dweck, C. (2012a). Implicit theories. In P. A. Van Lange, A. W. Kruglanski, & E. T. Higgins *Handbook of theories of social psychology: volume 2* (Vol. 2, pp. 43-61). SAGE Publications Ltd, https://www.doi.org/10.4135/9781446249222.n28

Dweck, C. S. (2012b). Mindsets and human nature: Promoting change in the Middle East, the schoolyard, the racial divide, and willpower. *American Psychologist*, *67*(8), 614.

Epley, N., & Schroeder, J. (2014). Mistakenly seeking solitude. *Journal of Experimental Psychology: General*, *143*(5), 1980.

Epley, N., Caruso, E. M., & Bazerman, M. H. (2006). When perspective taking increases taking: reactive egoism in social interaction. *Journal of personality and social psychology*, *91*(5), 872.

Estrada, C. A., Isen, A. M., & Young, M. J. (1997). Positive Affect Facilitates Integration of Information and Decreases Anchoring in Reasoning among Physicians. *Organizational Behavior and Human Decision Processes*, *72*(1), 117–135. https://doi.org/10.1006/obhd.1997.2734

Eyal, T., Steffel, M., & Epley, N. (2018). Perspective mistaking: Accurately understanding the mind of another requires getting perspective, not taking perspective. *Journal of Personality and Social Psychology*, *114*(4), 547.

Feinberg, M., & Willer, R. (2013). The moral roots of environmental attitudes. *Psychological science*, *24*(1), 56-62.

Feinberg, M., & Willer, R. (2015). From gulf to bridge: When do moral arguments facilitate political influence?. *Personality and Social Psychology Bulletin*, *41*(12), 1665-1681.

Feinberg, M., & Willer, R. (2019). Moral reframing: A technique for effective and persuasive communication across political divides. *Social and Personality Psychology Compass*, *13*(12), e12501.

Fernbach, P. M., Rogers, T., Fox, C. R., & Sloman, S. A. (2013). Political extremism is supported by an illusion of understanding. *Psychological science*, *24*(6), 939-946.

Feygina, I., Jost, J. T., & Goldsmith, R. E. (2010). System justification, the denial of global warming, and the possibility of "system-sanctioned change". *Personality and social psychology bulletin*, *36*(3), 326-338.

Fleeson, W., & Jayawickreme, E. (2015). Whole trait theory. *Journal of research in personality*, 56, 82-92.

Förster, J., Friedman, R. S., & Liberman, N. (2004). Temporal Construal Effects on Abstract and Concrete Thinking: Consequences for Insight and Creative Cognition. *Journal of Personality and Social Psychology*, *87*(2), 177–189. https://doi.org/10.1037/0022-3514.87.2.177

Fredrickson, B. L. (2001). The Role of Positive Emotions in Positive Psychology. *The American Psychologist*, *56*(3), 218–226.

Fredrickson, B. L. (2004). The broaden–and–build theory of positive emotions. *Philosophical Transactions of the Royal Society of London. Series B: Biological Sciences*, *359*(1449), 1367-1377.

Fredrickson, B. L., & Branigan, C. (2005). Positive emotions broaden the scope of attention and thought-action repertoires. *Cognition & Emotion*, *19*(3), 313–332. https://doi.org/10.1080/02699930441000238

Friedersdorf, C. (2018). A better way to look at most every political issue. *The Atlantic.* https://www.theatlantic.com/politics/archive/2018/02/a-better-way-to-look-at-most-every-political-issue/552752/

Gaertner, S. L., & Dovidio, J. F. (2014). Reducing intergroup bias: The common ingroup identity model. Psychology Press.

Gaertner, S. L., Dovidio, J. F., Banker, B. S., Houlette, M., Johnson, K. M., & McGlynn, E. A. (2000). Reducing intergroup conflict: From superordinate goals to decategorization, recategorization, and mutual differentiation. *Group Dynamics: Theory, Research, and Practice*, *4*(1), 98.

Galef, J. (2021). *The Scout Mindset: Why Some People See Things Clearly and Others Don't*. Penguin.

Galinsky, A. D., & Moskowitz, G. B. (2000). Perspective-taking: Decreasing stereotype expression, stereotype accessibility, and in-group favoritism. *Journal of Personality and Social Psychology*, *78*(4), 708–724. https://doi.org/10.1037/0022-3514.78.4.708

Galinsky, A. D., Ku, G., & Wang, C. S. (2005). Perspective-taking and self-other overlap: Fostering social bonds and facilitating social coordination. *Group Processes & Intergroup Relations*, *8*(2), 109-124.

Glass, B. D., Maddox, W. T., & Love, B. C. (2013). Real-time strategy game training: emergence of a cognitive flexibility trait. *PloS one*, *8*(8), e70350.

Graham, J., Haidt, J., Koleva, S., Motyl, M., Iyer, R., Wojcik, S. P., & Ditto, P. H. (2013). Moral foundations theory: The pragmatic validity of moral pluralism. In *Advances in Experimental Social Psychology* (Vol. 47, pp. 55-130). Academic Press.

Grossmann, I., Dorfman, A., Oakes, H., Santos, H. C., Vohs, K. D., & Scholer, A. A. (2021). Training for wisdom: The distanced-self-reflection diary method. *Psychological Science*, *32*(3), 381-394.

Grossmann, I., Gerlach, T. M., & Denissen, J. J. (2016). Wise reasoning in the face of everyday life challenges. *Social Psychological and Personality Science*, 7(7), 611-622.

Grossmann, I., Oakes, H., & Santos, H. C. (2019). Wise reasoning benefits from emodiversity, irrespective of emotional intensity. *Journal of Experimental Psychology: General,* 148(5), 805.

Grossmann, I., Weststrate, N. M., Ardelt, M., Brienza, J. P., Dong, M., Ferrari, M., ... & Vervaeke, J. (2020). The science of wisdom in a polarized world: Knowns and unknowns. *Psychological Inquiry*, *31*(2), 103-133.

Halperin, E. (2014a). Emotion, Emotion Regulation, and Conflict Resolution. *Emotion Review*, *6*(1), 68–76. https://doi.org/10.1177/1754073913491844

Halperin, E., & Gross, J. J. (2011a). Emotion regulation in violent conflict: reappraisal, hope, and support for humanitarian aid to the opponent in wartime. *Cognition & Emotion*, *25*(7), 1228–1236. https://doi.org/10.1080/02699931.2010.536081

Halperin, E., & Tagar, M. R. (2017). Emotions in conflicts: understanding emotional processes sheds light on the nature and potential resolution of intractable conflicts. *Current Opinion in Psychology*, *17*, 94–98. https://doi.org/10.1016/j.copsyc.2017.06.017

Halperin, E., Cohen-Chen, S., & Goldenberg, A. (2014b). Indirect emotion regulation in intractable conflicts: A new approach to conflict resolution. *European Review of Social Psychology*, *25*(1), 1-31.

Halperin, E., Crisp, R. J., Husnu, S., Trzesniewski, K. H., Dweck, C. S., & Gross, J. J. (2012). Promoting intergroup contact by changing beliefs: Group malleability, intergroup anxiety, and contact motivation. *Emotion*, *12*(6), 1192.

Halperin, E., Porat, R., Tamir, M., & Gross, J. J. (2013). Can emotion regulation change political attitudes in intractable conflicts? From the laboratory to the field. *Psychological science*, 24(1), 106-111.

Halperin, E., Russell, A.G., Trzesniewski, K.H., Gross, J. J., & Dweck, C.S. (2011b). Promoting the Middle East peace process by changing beliefs about group malleability. Science, 333, 1767–1769. doi:10.1126/science.1202925

Hameiri, B., Idan, O., Nabet, E., Bar-Tal, D., & Halperin, E. (2020). The paradoxical thinking 'sweet spot': The role of recipients' latitude of rejection in the effectiveness of paradoxical thinking messages targeting anti-refugee attitudes in Israel. *Journal of Social and Political Psychology*, *8*(1), 266-283.

Hameiri, B., Nabet, E., Bar-Tal, D., & Halperin, E. (2018). Paradoxical thinking as a conflict-resolution intervention: Comparison to alternative interventions and examination of psychological mechanisms. *Personality and Social Psychology Bulletin*, *44*(1), 122-139.

Hameiri, B., Porat, R., Bar-Tal, D., Bieler, A., & Halperin, E. (2014). Paradoxical thinking as a new avenue of intervention to promote peace. *Proceedings of the National Academy of Sciences*, *111*(30), 10996-11001.

Hare, W. (2009). What open-mindedness requires. *Skeptical Inquirer*, *33*(2), 36-39.

Hare, William. (2001). Bertrand Russell and the ideal of critical receptiveness. *Skeptical Inquirer, 25*, 3: 40- 44.

Hasson, Y., Amir, E., Sobol-Sarag, D., Tamir, M., & Halperin, E. (2022). Using performance art to promote intergroup prosociality by cultivating the belief that empathy is unlimited. *Nature Communications*, *13*(1), 1-15.

Hausmann, L. R., Levine, J. M., & Tory Higgins, E. (2008). Communication and group perception: Extending the 'saying is believing' effect. *Group Processes & Intergroup Relations*, *11*(4), 539-554.

Hernandez, I., & Preston, J. L. (2013). Disfluency disrupts the confirmation bias. *Journal of Experimental Social Psychology*, *49*(1), 178-182.

Hernández-Mogollon, R., Cepeda-Carrión, G., Cegarra-Navarro, J. G., & Leal-Millán, A. (2010). The role of cultural barriers in the relationship between open-mindedness and organizational innovation. *Journal of Organizational Change Management, 23*(4), 360-376.

Herrera, F., Bailenson, J., Weisz, E., Ogle, E., & Zaki, J. (2018). Building long-term empathy: A large-scale comparison of traditional and virtual reality perspective-taking. *PloS one*, *13*(10), e0204494.

Huang, K., Yeomans, M., Brooks, A. W., Minson, J., & Gino, F. (2017). It doesn't hurt to ask: Question-asking increases liking. *Journal of personality and social psychology*, *113*(3), 430.

Hussein, M. A., & Tormala, Z. L. (2021). Undermining your case to enhance your impact: A framework for understanding the effects of acts of receptiveness in persuasion. *Personality and Social Psychology Review*, *25*(3), 229-250.

Influs, M., Pratt, M., Masalha, S., Zagoory-Sharon, O., & Feldman, R. (2019). A social neuroscience approach to conflict resolution: dialogue intervention to Israeli and Palestinian youth impacts oxytocin and empathy. Social Neuroscience, 14(4), 378-389.

Isen, A. M., Daubman, K. A., & Nowicki, G. P. (1987). Positive affect facilitates creative problem solving. *Journal of personality and social psychology*, *52*(6), 1122.

Isen, A. M., Johnson, M. M., Mertz, E., & Robinson, G. F. (1985). The influence of positive affect on the unusualness of word associations. *Journal of Personality and Social Psychology*, *48*(6), 1413–1426.

Itzchakov, G., DeMarree, K. G., Kluger, A. N., & Turjeman-Levi, Y. (2018). The listener sets the tone: High-quality listening increases attitude clarity and behavior-intention consequences. *Personality and Social Psychology Bulletin*, *44*(5), 762-778.

Itzchakov, G., Kluger, A. N., & Castro, D. R. (2017). I am aware of my inconsistencies but can tolerate them: The effect of high quality listening on speakers' attitude ambivalence. *Personality and Social Psychology Bulletin*, *43*(1), 105-120.

Iyengar, S., Lelkes, Y., Levendusky, M., Malhotra, N., & Westwood, S. J. (2019). The origins and consequences of affective polarization in the United States. *Annual Review of Political Science*, *22*, 129-146.

Jayawickreme, E., Zachry, C. E., & Fleeson, W. (2019). Whole trait theory: An integrative approach to examining personality structure and process. *Personality and individual differences*, 136, 2-11.

Jetten, J., Spears, R., & Postmes, T. (2004). Intergroup Distinctiveness and Differentiation: A Meta-Analytic Integration. *Journal of Personality and Social Psychology*, *86*(6), 862–879. https://doi.org/10.1037/0022-3514.86.6.862

Jia, L., Hirt, E. R., & Karpen, S. C. (2009). Lessons from a faraway land: The effect of spatial distance on creative cognition. *Journal of Experimental Social Psychology*, *45*(5), 1127-1131.

John, O. P., Donahue, E. M., & Kentle, R. L. (1991). The Big Five Inventory—Versions 4a and 54. Berkeley, CA: University of California, Berkeley, Institute of Personality and Social Research.

Johnson, D. R., Murphy, M. P., & Messer, R. M. (2016). Reflecting on explanatory ability: A mechanism for detecting gaps in causal knowledge. *Journal of Experimental Psychology: General*, *145*(5), 573–588. https://doi.org/10.1037/xge0000161

Kabat-Zinn, J. (1990). Mindfulness-based stress reduction. *Using the Wisdom of Your Body and Mind to Face Stress, Pain, and Illness*, *467*.

Kabat-Zinn, J. (2003). Mindfulness-based interventions in context: Past, present, and future. Clinical Psychology: Science and Practice, 10(2), 144–156. https://doi.org/10.1093/clipsy.bpg016

Kalla, J. L., & Broockman, D. E. (2020). Reducing exclusionary attitudes through interpersonal conversation: Evidence from three field experiments. *American Political Science Review*, *114*(2), 410-425.

Kalla, J. L., & Broockman, D. E. (2021). Which Narrative Strategies Durably Reduce Prejudice? Evidence from Field and Survey Experiments Supporting the Efficacy of Perspective-Getting. *American Journal of Political Science*.

Keltner, D., & Robinson, R. J. (1993). Imagined ideological differences in conflict escalation and resolution. *International Journal of Conflict Management*.

Knab, N., Winter, K., & Steffens, M. C. (2021). Flexing the Extremes: Increasing Cognitive Flexibility With a Paradoxical Leading Questions Intervention. *Social Cognition*, *39*(2), 225-242.

Kross, E., & Ayduk, O. (2017). Self-distancing: Theory, research, and current directions. In *Advances in experimental social psychology* (Vol. 55, pp. 81-136). Academic Press.

Kross, E., & Grossmann, I. (2012). Boosting wisdom: Distance from the self enhances wise reasoning, attitudes, and behavior. *Journal of Experimental Psychology: General*, *141*(1), 43.

Kross, E., Duckworth, A., Ayduk, O., Tsukayama, E., & Mischel, W. (2011, July 4). The Effect of Self-Distancing on Adaptive Versus Maladaptive Self-Reflection in Children. Emotion. Advance online publication. doi: 10.1037/a0021787

Kruglanski & Webster, (1996). Motivated closing of the mind:" Seizing" and" freezing.". *Psychological Review,* 103, 263.

Kruglanski, A. W., & Fishman, S. (2009). The need for cognitive closure. *Handbook of individual differences in social behavio*r, 343-353.

Kubany, E. S., Richard, D. C., Bauer, G. B., & Muraoka, M. Y. (1992). Verbalized anger and accusatory" you" messages as cues for anger and antagonism among adolescents. *Adolescence*, *27*(107), 505.

Kunda, Z. (1990). The case for motivated reasoning. *Psychological bulletin*, *108*(3), 480.

Lakens, D. (2022). Sample size justification. Collabra: Psychology, 8(1), 33267.

Lambie, J. (2014). *How to be critically open-minded: A psychological and historical analysis.* Springer.

Lees, J., & Cikara, M. (2020). Inaccurate group meta-perceptions drive negative out-group attributions in competitive contexts. *Nature Human Behaviour 4*, 279–286 https://doi.org/10.1038/s41562-019-0766-4

Lees, J., & Cikara, M. (2021). Understanding and combating misperceived polarization. *Philosophical Transactions of the Royal Society B*, *376*(1822), 20200143.

Lerner, J. S., & Tetlock, P. E. (1999). Accounting for the effects of accountability. *Psychological Bulletin, 125*(2), 255–275. https://doi.org/10.1037/0033-2909.125.2.255

Levy, A., & Maaravi, Y. (2018). The boomerang effect of psychological interventions. *Social Influence*, *13*(1), 39-51.

Lieberman, A., & Schroeder, J. (2020). Two social lives: How differences between online and offline interaction influence social outcomes. *Current Opinion in Psychology*, *31*, 16-21.

Lieberman, M. D. (2022). Seeing minds, matter, and meaning: The CEEing model of pre-reflective subjective construal. Psychological Review, 129(4), 830–872. https://doi.org/10.1037/rev0000362

Light, N., & Fernbach, P. (2020). The role of knowledge calibration in intellectual humility. In *The Routledge Handbook of Philosophy of Humility* (pp. 411-424). Routledge.

Lilienfeld, S. O., Ammirati, R., & Landfield, K. (2009). Giving debiasing away: Can psychological research on correcting cognitive errors promote human welfare?. *Perspectives on Psychological Science*, *4*(4), 390-398.

Lord, C. G., Lepper, M. R., & Preston, E. (1984). Considering the opposite: A corrective strategy for social judgment. *Journal of Personality and Social Psychology*, *47*(6), 1231–1243. https://doi.org/10.1037/0022-3514.47.6.1231

Lyons, B., Farhart, C., Hall, M., Kotcher, J., Levendusky, M., Miller, J., . . . Zhao, X. (2021). Self-Affirmation and Identity-Driven Political Behavior. *Journal of Experimental Political Science,* 1-16. doi:10.1017/XPS.2020.46

Lyons, T., & Carhart-Harris, R. L. (2018). Increased nature relatedness and decreased authoritarian political views after psilocybin for treatment-resistant depression. Journal of Psychopharmacology, 32(7), 811-819.

MacLean, K. A., Johnson, M. W., & Griffiths, R. R. (2011). Mystical experiences occasioned by the hallucinogen psilocybin lead to increases in the personality domain of openness. Journal of psychopharmacology, 25(11), 1453-1461.

Macnamara, B. N., & Burgoyne, A. P. (2023). Do growth mindset interventions impact students' academic achievement? A systematic review and meta-analysis with recommendations for best practices. Psychological Bulletin, 149(3-4), 133.

Mason, N. L., Kuypers, K. P. C., Reckweg, J. T., Müller, F., Tse, D. H. Y., Da Rios, B., ... & Ramaekers, J. G. (2021). Spontaneous and deliberate creative cognition during and after psilocybin exposure. Translational psychiatry, 11(1), 1-13.

McCrae, R. R., & Costa, P.T., Jr. (1987). Validation of the Five-Factor Model of personality across instruments and observers. *Journal of Personality and Social Psychology*, 52, 81-90.

McDonald, M., Porat, R., Yarkoney, A., Reifen Tagar, M., Kimel, S., Saguy, T., & Halperin, E. (2017). Intergroup emotional similarity reduces dehumanization and promotes conciliatory attitudes in prolonged conflict. *Group Processes & Intergroup Relations*, *20*(1), 125–136. https://doi.org/10.1177/1368430215595107

Minson, J., Chen, F., & Tinsley, C. H. (September, 2018), Why Won't You Listen to Me? Measuring Receptiveness to Opposing Views. HKS Working Paper No. RWP18-028; Georgetown

McDonough School of Business Research Paper No. 3295946. Available at SSRN: https://ssrn.com/abstract=3295946

Mitchell, R. L. C., & Phillips, L. H. (2007). The psychological, neurochemical and functional neuroanatomical mediators of the effects of positive and negative mood on executive functions. *Neuropsychologia*, *45*(4), 617–629. https://doi.org/10.1016/j.neuropsychologia.2006.06.030

Moore-Berg, S. L., Ankori-Karlinsky, L. O., Hameiri, B., & Bruneau, E. (2020). Exaggerated meta-perceptions predict intergroup hostility between American political partisans. *Proceedings of the National Academy of Sciences*, *117*(26), 14864-14872.

Morewedge, C. K., Yoon, H., Scopelliti, I., Symborski, C. W., Korris, J. H., & Kassam, K. S. (2015). Debiasing decisions: Improved decision making with a single training intervention. *Policy Insights from the Behavioral and Brain Sciences*, *2*(1), 129-140.

Morris, M., Nadler, J., Kurtzberg, T., & Thompson, L. (2002). Schmooze or lose: Social friction and lubrication in e-mail negotiations. *Group Dynamics: Theory, Research, and Practice*, *6*(1), 89.

Murray, N., Sujan, H., Hirt, E. R., & Sujan, M. (1990). The influence of mood on categorization: A cognitive flexibility interpretation. *Journal of Personality and Social Psychology*, *59*(3), 411–425. https://doi.org/10.1037/0022-3514.59.3.411

Nadler, J. (2003). Rapport in negotiation and conflict resolution. *Marq. L. Rev.*, *87*, 875.

Nasie, M., Bar-Tal, D., Pliskin, R., Nahhas, E., & Halperin, E. (2014). Overcoming the barrier of narrative adherence in conflicts through awareness of the psychological bias of naïve realism. *Personality and social psychology bulletin*, *40*(11), 1543-1556.

Nelson, D. W. (2009). Feeling good and open-minded: The impact of positive affect on cross cultural empathic responding. *The Journal of Positive Psychology*, *4*(1), 53–63. https://doi.org/10.1080/17439760802357859

Nielsen, K., & Abildgaard, J. S. (2013). Organizational interventions: A research-based framework for the evaluation of both process and effects. *Work & Stress, 27*(3), 278-297.

Nisbett, R. E., & Ross, L. (1980). *Human inference: Strategies and shortcomings of social judgment.* Prentice Hall.

Nussbaum, A. D., & Dweck, C. S. (2008). Defensiveness versus remediation: Self-theories and modes of self-esteem maintenance. *Personality and Social Psychology Bulletin*, *34*(5), 599-612.

Oaksford, M., Morris, F., Grainger, B., & Williams, J. M. G. (1996). Mood, reasoning, and central executive processes. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *22*(2), 476–492. https://doi.org/10.1037/0278-7393.22.2.476

Ofosu, E. K., Chambers, M. K., Chen, J. M., & Hehman, E. (2019). Same-sex marriage legalization associated with reduced implicit and explicit antigay bias. *Proceedings of the National Academy of Sciences, 116*(18), 8846-8851.

Okimoto, T. G., & Wenzel, M. (2011). The other side of perspective taking: Transgression ambiguity and victims' revenge against their offender. *Social Psychological and Personality Science*, *2*(4), 373-378.

Owen, A. M., Hampshire, A., Grahn, J. A., Stenton, R., Dajani, S., Burns, A. S., ... & Ballard, C. G. (2010). Putting brain training to the test. *Nature*, *465*(7299), 775-778.

Paluck, E. L. (2010). Is it better not to talk? Group polarization, extended contact, and perspective taking in Eastern Democratic Republic of Congo. *Personality & Social Psychology Bulletin*, *36*(9), 1170–1185. https://doi.org/10.1177/0146167210379868

Paluck, E. L., Porat, R., Clark, C. S., & Green, D. P. (2020). Prejudice reduction: Progress and challenges. *Annual Review of Psychology, 72.*

Paluck, E. L., Shepherd, H., & Aronow, P. M. (2016). Changing climates of conflict: A social network experiment in 56 schools. *Proceedings of the National Academy of Sciences*, *113*(3), 566-571.

Paolini, S., Harwood, J., & Rubin, M. (2010). Negative intergroup contact makes group memberships salient: Explaining why intergroup conflict endures. *Personality and Social Psychology Bulletin*, *36*(12), 1723-1738.

Park, J., & Banaji, M. R. (2000). Mood and heuristics: the influence of happy and sad states on sensitivity and bias in stereotyping. *Journal of personality and social psychology*, *78*(6), 1005.

Pennycook, G., Epstein, Z., Mosleh, M., Arechar, A. A., Eckles, D., & Rand, D. G. (2021). Shifting attention to accuracy can reduce misinformation online. *Nature*, *592*(7855), 590-595.

Pettigrew, T. F. (1998). Intergroup contact theory. Annual review of psychology, 49(1), 65-85.

Pettigrew, T. F., & Tropp, L. R. (2006). A meta-analytic test of intergroup contact theory. *Journal of personality and social psychology*, *90*(5), 751.

Pettigrew, T. F., Tropp, L. R., Wagner, U., & Christ, O. (2011). Recent advances in intergroup contact theory. *International journal of intercultural relations*, *35*(3), 271-280.

Pew Research Center for the People and the Press. (2015). *Support for same-sex marriage at record high, but key segments remain opposed* [Report]. http://www.people-press.org/2015/06/08/support-for-same-sex-marriage-at-record-highbut-key-segments-remain-opposed/

Pew Research Center. (2019). *Partisan Antipathy: More intense, more personal* [Report]. https://www.pewresearch.org/politics/2019/10/10/how-partisans-view-each-other/

Pew Research Center. (2020). *Few Trump or Biden supporters have close friends who back the opposing candidate* [Report]. https://www.pewresearch.org/short-reads/2020/09/18/few-trump-or-biden-supporters-have-close-friends-who-back-the-opposing-candidate/

Phillips, L. H., Bull, R., Adams, E., & Fraser, L. (2002). Positive mood and executive function: evidence from stroop and fluency tasks. *Emotion*, *2*(1), 12.

Pierce, J. R., Kilduff, G. J., Galinsky, A. D., & Sivanathan, N. (2013). From glue to gasoline: how competition turns perspective takers unethical. *Psychological Science*, *24*(10), 1986–1994. https://doi.org/10.1177/0956797613482144

Porat, R., Erel, L., Pnueli, V., & Halperin, E. (2020). Developing ReApp: an emotion regulation mobile intervention for intergroup conflict. *Cognition and Emotion*, *34*(7), 1326-1342.

Porter, T., & Schumann, K. (2018). Intellectual humility and openness to the opposing view. *Self and Identity*, *17*(2), 139-162.

Porter, T., Elnakouri, A., Meyers, E. A., Shibayama, T., Jayawickreme, E., & Grossmann, I. (2022). Predictors and consequences of intellectual humility. *Nature Reviews Psychology*, 1(9), 524-536.

Porter, T., Schumann, K., Selmeczy, D., & Trzesniewski, K. (2020). Intellectual humility predicts mastery behaviors when learning. *Learning and Individual Differences*, 80, 101888.

Project on Liberal Education, & the Sciences (American Association for the Advancement of Science). (1990). The Liberal Art of Science: Agenda for Action: the Report of the Project on Liberal Education and the Sciences. American Association for the Advancement of Science.

Quaglia, J. T., Brown, K. W., Lindsay, E. K., Creswell, J. D., & Goodman, R. J. (2015). From conceptualization to operationalization of mindfulness. *Handbook of mindfulness: Theory, research, and practice*, 151-170.

Quoidbach, J., Gruber, J., Mikolajczak, M., Kogan, A., Kotsou, I., & Norton, M. I. (2014). Emodiversity and the emotional ecosystem. *Journal of experimental psychology: General*, *143*(6), 2057.

Regan, D. T., & Totten, J. (1975). Empathy and attribution: Turning observers into actors. *Journal of Personality and Social Psychology*, *32*(5), 850–856. https://doi.org/10.1037/0022-3514.32.5.850

Rollwage, M., & Fleming, S. M. (2021). Confirmation bias is adaptive when coupled with efficient metacognition. *Philosophical Transactions of the Royal Society B*, *376*(1822), 20200131.

Rollwage, M., Dolan, R. J., & Fleming, S. M. (2018). Metacognitive failure as a feature of those holding radical beliefs. *Current Biology*, *28*(24), 4014-4021.

Roseman, L., Ron, Y., Saca, A., Ginsberg, N., Luan, L., Karkabi, N., ... & Carhart-Harris, R. (2021). Relational processes in ayahuasca groups of palestinians and israelis. Frontiers in pharmacology, 300.

Ross, L., & Ward, A. (1996). Naive realism in everyday life: Implications for social conflict and misunderstanding. In E. S. Reed, E. Turiel, & T. Brown (Eds.), Values and knowledge (pp. 103–135). Lawrence Erlbaum Associates, Inc.

Rozenblit, L., & Keil, F. (2002). The misunderstood limits of folk science: An illusion of explanatory depth. *Cognitive science*, *26*(5), 521-562.

Ruggeri, K., Većkalov, B., Bojanić, L., Andersen, T. L., Ashcroft-Jones, S., Ayacaxli, N., ... & Folke, T. (2021). The general fault in our fault lines. *Nature Human Behaviour*, 1-11.

Russell, B. (1928). *Sceptical Essays.* New York: W.W. Norton.

Sandstrom, G. M., & Boothby, E. J. (2021). Why do people avoid talking to strangers? A mini meta-analysis of predicted fears and actual experiences talking to a stranger. *Self and Identity*, *20*(1), 47-71.

Sassenrath, C., Hodges, S. D., & Pfattheicher, S. (2016). It's all about the self: When perspective taking backfires. *Current Directions in Psychological Science*, *25*(6), 405-410.

Schein, E. H. (1990). Organizational culture. *American Psychologist, 45*(2), 109–119. https://doi.org/10.1037/0003-066X.45.2.109

Schroeder J. (2022). We have to talk: Spoken conversation resolves conflict more effectively than written conversation. In preparation.

Schumann, K., Zaki, J., & Dweck, C. S. (2014). Addressing the empathy deficit: Beliefs about the malleability of empathy predict effortful responses when empathy is challenging. *Journal of Personality and Social Psychology*, *107*(3), 475.

Schwarz, N. (2000). Agenda 2000—Social judgment and attitudes: warmer, more social, and less conscious. *European Journal of Social Psychology*, *30*(2), 149-176.

Seifert, T. A., Goodman, K. M., Lindsay, N., Jorgensen, J. D., Wolniak, G. C., Pascarella, E. T., & Blaich, C. (2008). The effects of liberal arts experiences on liberal arts outcomes. *Research in Higher Education*, 49, 107-125.

Shapiro, I. (2006). Extending the framework of inquiry: Theories of change in conflict interventions. *Berghof Handbook*, (5).

Shelton, J. N. (2003). Interpersonal concerns in social encounters between majority and minority group members. Group Processes & Intergroup Relations, 6(2), 171-185.

Sherif, M., & Hovland, C. I. (1961). Social judgment: *Assimilation and contrast effects in communication and attitude change.* Yale University Press.

Simmons, R. A., Gordon, P. C., & Chambless, D. L. (2005). Pronouns in marital interaction: What do "you" and "I" say about marital health?. *Psychological science*, *16*(12), 932-936.

Simons, D. J., Boot, W. R., Charness, N., Gathercole, S. E., Chabris, C. F., Hambrick, D. Z., & Stine-Morrow, E. A. (2016). Do "brain-training" programs work?. *Psychological Science in the Public Interest*, *17*(3), 103-186.

Singer, T., & Engert, V. (2019). It matters what you practice: Differential training effects on subjective experience, behavior, brain and body in the ReSource Project. *Current Opinion in Psychology*, *28*, 151-158.

Skorinko, J. L., & Sinclair, S. A. (2013). Perspective taking can increase stereotyping: The role of apparent stereotype confirmation. *Journal of Experimental Social Psychology*, *49*(1), 10–18. https://doi.org/10.1016/j.jesp.2012.07.009

Soto, C. J., & John, O. P. (2017). The next Big Five Inventory (BFI-2): Developing and assessing a hierarchical model with 15 facets to enhance bandwidth, fidelity, and predictive power. Journal of personality and social psychology, 113, 117-143.

Spiegel, J. S. (2012). Open-mindedness and intellectual humility. *Theory and Research in Education*, 10(1), 27–38. https://doi.org/10.1177/1477878512437472

Spies, K., Hesse, F., & Hummitzsch, C. (1996). Mood and capacity in Baddeley's model of human memory. *Zeitschrift Für Psychologie Mit Zeitschrift Für Angewandte Psychologie*, *204*(4), 367–381.

Stanovich, K. E., & West, R. F. (2000). Individual differences in reasoning: Implications for the rationality debate?. *Behavioral and Brain Sciences*, *23*(5), 645-665.

Steele, C. M. (1988). The psychology of self-affirmation: Sustaining the integrity of the self. In *Advances in experimental social psychology* (Vol. 21, pp. 261–302). Elsevier.

Stets, J. E., & Burke, P. J. (2000). Identity theory and social identity theory. *Social psychology quarterly*, 224-237.

Steward, J. H. (1972). *Theory of culture change: The methodology of multilinear evolution.* University of Illinois Press.

Stieger, M., Wepfer, S., Rüegger, D., Kowatsch, T., Roberts, B. W., & Allemand, M. (2020). Becoming more conscientious or more open to experience? Effects of a two-week smartphone-based intervention for personality change. European Journal of Personality, 34(3), 345-366.

Symborski, C., Barton, M., Quinn, M., Morewedge, C., Kassam, K., Korris, J. H., & Hollywood, C. A. (2014). Missing: A serious game for the mitigation of cognitive biases. In *Interservice/Industry Training, Simulation, and Education Conference (I/ITSEC)* (No. 14295, pp. 1-13).

Tamir, D. I., & Mitchell, J. P. (2012). Disclosing information about the self is intrinsically rewarding. *Proceedings of the National Academy of Sciences*, *109*(21), 8038-8043.

Tamir, M., Halperin, E., Porat, R., Bigman, Y. E., & Hasson, Y. (2019). When there's a will, there's a way: Disentangling the effects of goals and means in emotion regulation. *Journal of Personality and Social Psychology, 116*(5), 795–816. https://doi.org/10.1037/pspp0000232

Tankard, M. E., & Paluck, E. L. (2016). Norm perception as a vehicle for social change. *Social Issues and Policy Review, 10*(1), 181-211.

Tankard, M. E., & Paluck, E. L. (2017). The effect of a Supreme Court decision regarding gay marriage on social norms and personal attitudes. *Psychological Science, 28*(9), 1334-1344.

Tarrant, M., Calitri, R., & Weston, D. (2012). Social Identification Structures the Effects of Perspective Taking. *Psychological Science*, *23*(9), 973–978. https://doi.org/10.1177/0956797612441221

Thompson, L. L. (1991). Information exchange in negotiation. *Journal of Experimental Social Psychology*, *27*(2), 161–179. https://doi.org/10.1016/0022-1031(91)90020-7

Todd, A. R., & Burgmer, P. (2013). Perspective taking and automatic intergroup evaluation change: Testing an associative self-anchoring account. *Journal of Personality and Social Psychology*, *104*(5), 786–802. https://doi.org/10.1037/a0031999

Todd, A. R., & Galinsky, A. D. (2014). Perspective-Taking as a Strategy for Improving Intergroup Relations: Evidence, Mechanisms, and Qualifications. *Social and Personality Psychology Compass*, *8*(7), 374–387. https://doi.org/10.1111/spc3.12116

Todd, A. R., Bodenhausen, G. V., & Galinsky, A. D. (2012). Perspective taking combats the denial of intergroup discrimination. *Journal of Experimental Social Psychology*, *48*(3), 738–745. https://doi.org/10.1016/j.jesp.2011.12.011

Trope, Y., & Liberman, N. (2010). Construal-Level Theory of Psychological Distance. *Psychological Review*, *117*(2), 440–463. https://doi.org/10.1037/a0018963

Tuller, H. M., Bryan, C. J., Heyman, G. D., & Christenfeld, N. J. (2015). Seeing the other side: Perspective taking and the moderation of extremity. *Journal of Experimental Social Psychology*, *59*, 18-23.

Turner, J. C., Hogg, M. A., Oakes, P. J., Reicher, S. D., & Wetherell, M. S. (1987). Rediscovering the social group: A self-categorization theory. basil Blackwell.

Tversky, A., & Kahneman, D. (1974). Judgment under uncertainty: Heuristics and biases. *Science*, *185*(4157), 1124-1131.

Valente, T. W. (2012). Network interventions. *Science, 337*(6090), 49-53.

Vallone, R. P., Ross, L., & Lepper, M. R. (1985). The hostile media phenomenon: Biased perception and perceptions of media bias in coverage of the Beirut massacre. *Journal of Personality and Social Psychology*, *49*(3), 577–585. https://doi.org/10.1037/0022-3514.49.3.577

Van Bavel, J. J., & Pereira, A. (2018). The partisan brain: An identity-based model of political belief. *Trends in cognitive sciences*, *22*(3), 213-224.

Van Loon, A., Bailenson, J., Zaki, J., Bostick, J., & Willer, R. (2018). Virtual reality perspective-taking increases cognitive empathy for specific others. *PloS one*, *13*(8), e0202442.

Vescio, T. K., Sechrist, G. B., & Paolucci, M. P. (2003). Perspective taking and prejudice reduction: The mediational role of empathy arousal and situational attributions. *European Journal of Social Psychology*, *33*(4), 455-472.

Voelkel, J. G., Brandt, M. J., & Colombo, M. (2018). I know that I know nothing: Can puncturing the illusion of explanatory depth overcome the relationship between attitudinal dissimilarity and prejudice?. *Comprehensive Results in Social Psychology*, *3*(1), 56-78.

Voelkel, J. G., Stagnaro, M.N., Chu, J., Pink, S., Mernyk, J., Redekopp, C., Cashman, M., Druckman, J., Rand, D., & Willer, R. Megastudy identifying successful interventions to strengthen Americans' democratic attitudes. (In Press).

Walton, G. M. (2014). The new science of wise psychological interventions. *Current Directions in Psychological Science*, *23*(1), 73-82.

Walton, G. M., & Wilson, T. D. (2018). Wise interventions: Psychological remedies for social and personal problems. *Psychological Review*, *125*(5), 617.

Ward, A., Atkins, D. C., Lepper, M. R., & Ross, L. (2011). Affirming the self to promote agreement with another: lowering a psychological barrier to conflict resolution. *Personality & Social Psychology Bulletin*, *37*(9), 1216–1228. https://doi.org/10.1177/0146167211409439

Warner, B. R., & Villamil, A. (2017). A test of imagined contact as a means to improve cross-partisan feelings and reduce attribution of malevolence and acceptance of political violence. *Communication Monographs*, *84*(4), 447-465.

Waytz, A., Young, L. L., & Ginges, J. (2014). Motive attribution asymmetry for love vs. hate drives intractable conflict. *Proceedings of the National Academy of Sciences*, *111*(44), 15687-15692.

Wegener, D. T., Petty, R. E., & Dunn, M. (1998). The metacognition of bias correction: Naive theories of bias and the flexible correction model. In V. Yzerbyt, G. Lories, & B. Dardenne (Eds.), *Metacognition: Cognitive and social dimensions.* New York: Sage.

Wegener, D. T., Petty, R. E., & Smith, S. M. (1995). Positive mood can increase or decrease message scrutiny: The hedonic contingency view of mood and message processing. *Journal of Personality and Social Psychology*, *69*(1), 5–15. https://doi.org/10.1037/0022-3514.69.1.5

Weisz, E., & Cikara, M. (2021). Strategic Regulation of Empathy. *Trends in Cognitive Sciences*, *25*(3), 213–227. https://doi.org/10.1016/j.tics.2020.12.002

Weisz, E., & Zaki, J. (2018). Motivated empathy: A social neuroscience perspective. *Current Opinion in Psychology*, *24*, 67–71. https://doi.org/10.1016/j.copsyc.2018.05.005

Weisz, E., Ong, D. C., Carlson, R. W., & Zaki, J. (2020). Building empathy through motivation-based interventions. *Emotion*. https://doi.org/10.1037/emo0000929

Welker, K. M., Duong, M., Rakhshani, A., Dieffenbach, M., Coleman, P., & Haidt, J. (2023). The Online Educational Program 'Perspectives' Improves Affective Polarization, Intellectual Humility, and Conflict Management. *Journal of Social and Political Psychology*, 11(2), 437-457.

Yang, D. Y. J., Preston, J. L., & Hernandez, I. (2013). Polarized attitudes toward the Ground Zero mosque are reduced by high-level construal. *Social Psychological and Personality Science*, *4*(2), 244-250.

Yeager, D. S., & Walton, G. M. (2011). Social-psychological interventions in education: They're not magic. *Review of educational Research*, *81*(2), 267-301.

Yee, N., Bailenson, J. N., & Ducheneaut, N. (2009). The Proteus effect: Implications of transformed digital self-representation on online and offline behavior. *Communication Research*, *36*(2), 285-312.

Yeomans, M., Minson, J., Collins, H., Chen, F., & Gino, F. (2020). Conversational receptiveness: Improving engagement with opposing views. *Organizational Behavior and Human Decision Processes*, *160*, 131-148.

Zebel, S., Doosje, B., & Spears, R. (2009). How perspective-taking helps and hinders group-based guilt as a function of group identification. *Group Processes & Intergroup Relations*, *12*(1), 61-78.

Zmigrod, L. (2020). The role of cognitive rigidity in political ideologies: theory, evidence, and future directions. *Current Opinion in Behavioral Sciences*, *34*, 34-39.