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Why Some Psychotherapists Benefit From Feedback on Treatment Progress More Than Others: A Belief Updating Perspective

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Monitoring of patient-reported outcomes and providing therapists with progress feedback has been shown to be beneficial for treatment outcomes (e.g., by preventing therapy failures). Despite recent advances in monitoring and feedback research, little is known about why some therapists benefit from feedback more than others. Addressing this issue, the present article uses the basic science literature on belief updating to propose a theoretical model for these between-therapist differences. In doing so, we provide a novel framework that allows testable hypotheses about when and how feedback on therapy progress is likely to improve treatment outcomes. In particular, we argue that the integration of feedback and its effect on therapists' behavior depends on the weight therapists assign to their prior beliefs regarding treatment progress relative to the weight of the feedback received. We conclude by outlining some directions for future research on the underpinnings of this model, and point to some implications for the training of therapists and provision of feedback.

Public Health Significance Statement

This article shed some light on when and how feedback actually influences treatment outcomes and why some therapists benefit from feedback more than others. By proposing a novel belief updating framework to feedback research, this account highlights that the integration of feedback and its effect on therapists' behavior depends on the weight therapists assign to their prior beliefs regarding treatment progress relative to the weight of the feedback received.

Keywords: routine outcome monitoring, progress feedback, belief updating, active inference, predictive processing

Notwithstanding the relatively large average effects of psychological therapies in randomized-controlled trials (e.g., for posttraumatic stress disorder [PTSD]: Schnurr et al., 2022) and practice-based studies (e.g., for PTSD: Herzog et al., 2021), treatment nonresponse, dropout, and deterioration still are a pervasive problem on an individual level. However, studies have shown that therapists usually cannot reliably assess when a patient is not responding or even deteriorating in therapy (Hannan et al., 2005; Hatfield et al., 2010; Hill et al., 1993, 1996; Regan & Hill, 1992; Rhodes et al., 1994), despite the fact that nonresponse rates across different disorders are as

high as about 50% (e.g., Barkham & Lambert, 2021; Westen & Morrison, 2001) and about 10% of patients show negative effects (e.g., Lilienfeld, 2007). In fact, a high discrepancy between observer- and patient-reported outcome after routine inpatient treatment for depression recently reported points toward a too-optimistic clinicians' judgment (Kaiser et al., 2022), highlighting that therapists tend to overestimate improvements in patients and underestimate deterioration. This 'blind eye' of therapists for negative developments in their patients has been explained with a general positivity bias when it comes to self-assessments (e.g., Svenson, 1981). For example, a compelling study reported that 90% of all mental health professionals rated their skills in the top 25% compared to their peers, with none of the participants rating themselves as below average (Walfish et al., 2012). Patient-reported routine outcome monitoring (PROM) is considered to counteracting these biases and thus improve the quality of care, especially for patients at risk for treatment failure (de Jong et al., 2021; Lambert, 2017).

In addition to supervision and clinical experience as general feedback methods (Sapyta et al., 2005), monitoring of patient-reported outcomes and providing therapists with progress feedback has a long research tradition (Harmon et al., 2005; Lambert et al., 2001). Monitoring of patient treatment response and alerting therapists after each treatment session (e.g., use of warning signals and support

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through problem-solving strategies) can be a powerful way to reduce negative treatment trajectories or rates of deterioration and change in predicted treatment failures, and thus increase treatment outcome by providing timely feedback to treatment providers (e.g., increasing the efficacy for “not-on-track” patients, reducing the length of therapy for “on-track” patients) (e.g., Delgadillo et al., 2017, 2018; Lambert & Harmon, 2018; Lambert & Shimokawa, 2011; Lambert et al., 2018; Shimokawa et al., 2010; Simon et al., 2012). The most recent and comprehensive meta-analysis empirically summarized that feedback from progress measures within developed clinical support tools (CST) can be helpful: Progress feedback has been constantly found to improve outcomes and reduce dropout, treatment duration, and deterioration, yet with small effect sizes (de Jong et al., 2021).

In Germany, for example, this research approach has been implemented with the Trier Therapy Navigator (TTN; Lutz, De Jong, & Rubel, 2015; Lutz et al., 2019): A prospective randomized-controlled trial investigating the TTN for clinical practice shows promising findings that therapists are able to learn from and incorporate such systems into their clinical practice in the case of high-quality implementation of these data-informed digital clinical decision support systems (Lutz et al., 2022). However, they also highlight once more to focus on building acceptance of such systems and reducing barriers to the use of feedback on the *therapists’ side*, as the implementation of such tools is still sometimes met with resistance among therapists who see it as a curtailment of their therapeutic freedom (Jensen-Doss & Hawley, 2010).

Despite the large body of research and the robustness of the effects of routine outcome monitoring (ROM) and feedback, relatively little is known about the circumstances which are necessary for feedback to work. For example, it has been shown that therapists do not uniformly benefit from receiving feedback. In a randomized-controlled trial in which therapists treated patients in a feedback condition and in a treatment-as-usual condition without feedback, Simon et al. (2012) showed that only 50% of the therapists produced better results with patients for whom they received progress feedback than with patients for whom they did not receive any feedback. Secondary analyses showed that therapists who benefited more from the feedback were those that reported to actually have used the feedback (Simon et al., 2012). To distinguish between feedback user and nonuser, studies investigated therapist features and found that therapists who are more satisfied with the feedback system, female therapists, and those reporting a higher commitment to use the feedback are more likely to use the feedback (de Jong et al., 2012; Lutz, Rubel, et al., 2015). Yet, it remains unclear what feedback usage means. So far, studies relied on therapists’ self-report of whether or not they used the feedback. However, feedback usage is quite a complex construct which needs further investigation. To use feedback, therapists need to integrate new information into their beliefs about a given patient in order to change their therapeutic behavior according to the relevant information provided by feedback.

Theoretical Foundations of Feedback

Research on the nature of feedback and, in particular, how to deliver feedback most effectively to increase its use is scarce. To the best of our knowledge, there is only one clinical model to explain how feedback is interpreted and used—the contextual feedback intervention theory (CFIT; Sapyta et al., 2005). Based on the premise that

therapists are self-determined in their learning and pursue the goal to help their patients, this model aims to facilitate the self-regulation process of practitioners. In fact, they propose that the provision of *accurate* feedback is key in the improvement of this self-regulation process, while several factors (e.g., goal commitment, feedback itself, cognitive dissonance, and personal responsibility) affect the ways a therapist interprets and uses the feedback provided. There are numerous factors that influence feedback use: feedback source (e.g., task, therapist herself, supervisors, patients, and peers; Ashford, 1993, p. 199), feedback content such as the information value (i.e., if the feedback contains new information; Ilgen et al., 1979), feedback sign (i.e., positive vs. negative), and feedback format (timing of the feedback immediate vs. delayed with better outcome of prompt feedback, frequently, verbally vs. written vs. graphically, cognitively simple; Sapyta et al., 2005).

According to CFIT (Sapyta et al., 2005), particularly, the therapist must perceive the source as *credible* to attend to and accept the feedback provided (Ilgen et al., 1979). In case therapists do not perceive the feedback to be credible, valid, informative, or useful, they are more likely to dismiss it whenever it does not fit their own *beliefs*. The information provided can be about outcomes, about a therapy progress, or about the accuracy of a judgment (i.e., receiving feedback about their actual behavior rather than about clinical outcomes). Furthermore, it depends on the type of information (performance vs. formative feedback) with formative feedback being concrete suggestions about ways to improve (e.g., change in therapeutic behavior). In other words, feedback can be neutral or contain an evaluative judgment. Put together, feedback needs to be objective, specific, received quickly, and fit a therapist’s goals. However, receiving accurate feedback from a credible source is a necessary but not sufficient condition, as the therapist’s evaluation of the relevance of the *new information* provided by feedback varies from individual to individual and depends on their own *prior beliefs*.

Although CFIT makes important suggestions on how to provide the most accurate and credible feedback to increase its use, it gives only small insights into the therapists’ side to explain how progress feedback is processed and integrated to improve treatment outcomes in psychological therapies. By building up on the CFIT account (Sapyta et al., 2005), we seek to apply current cognitive theories (i.e., research on belief updating) to provide a novel mechanistic model of when and how feedback on treatment progress leads to improved treatment outcomes in psychotherapy.

Belief Updating as an Insightful Framework

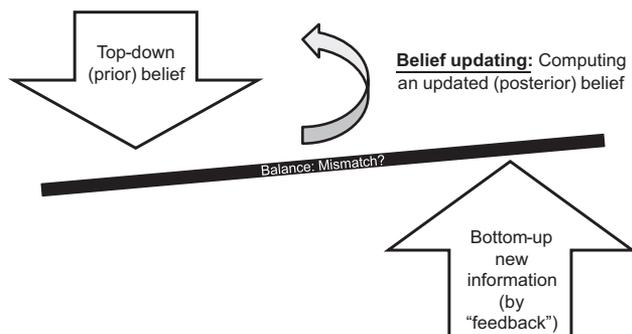
Humans use information to form and update their beliefs, but why and when people do (or do not) change their beliefs has been a puzzle for decades (e.g., holding false beliefs despite ample contradictory evidence vs. changing beliefs without sufficient reason). Inspired by current theories of fundamental working principles of the human brain (e.g., predictive processing) in computational neuroscience (Clark, 2013; K. Friston, 2005, 2009), belief updating is a continuously growing field of research that investigates how people adjust their beliefs in light of new evidence. In that research, the brain is considered as a hypothesis-testing organ (K. J. Friston et al., 2014) relying on principles of Bayesian inference (i.e., minimizing uncertainty by continuously testing hypotheses regarding the causes of sensations).

While beliefs are defined as conscious or explicit cognitions relating to the self, other people, or perceptions of the world,¹ belief updating describes the process of how people integrate new information to update their beliefs (Bromberg-Martin & Sharot, 2020). According to this line of research, a prior belief is combined with new information (e.g., provided by feedback) to compute a posterior belief (i.e., an updated belief), as illustrated in Figure 1. If new information critically deviates from the prior belief, a mismatch (i.e., “prediction error”) is generated. When such a mismatch occurs, the human brain seeks to refine its beliefs (i.e., hypotheses) and maximize evidence with the aim to optimize for its internal model of the world and others (e.g., patients) by minimizing this mismatch and thus uncertainty—a process called active inference.

Applied to psychotherapy, the therapeutic context can be considered as a continuously constructive process of hypothesis testing, where the therapist aims to select the hypothesis that best explains new information given by progress feedback. In this process, the therapist decides how much weight is given to new information relative to their prior beliefs—a phenomenon known as precision weighting, as illustrated in Figure 2. That is, precision can refer to both the reliability of new information and the confidence afforded to prior beliefs. Their balance critically determines the extent to which a prior belief is updated given new information provided by feedback. Put simply, if the prior belief is afforded low precision (referred to as “weak priors”), new information by precise (i.e., accurate) feedback has much influence on the formation of the posterior belief, while the opposite is true for “strong priors.” In other words, if therapists are unsure about how much they can trust their own perception of how the patient fares (i.e., their beliefs), they prefer to rely on the feedback (i.e., new information) in case of a mismatch between therapist and patient perspective, provided that this feedback appears sufficiently valid (i.e., high accuracy/precision). On the other hand, if therapists are very convinced that their perception of how the patient is doing is correct (i.e., they afford their prior beliefs overly much precision), these beliefs dominate decision making such that information consistent with prior beliefs is prioritized and discrepant information is largely neglected (Powers et al., 2017). In case the feedback is perceived as imprecise (i.e., inaccurate), beliefs are, if any, only updated when the prior belief has also a low precision, not in case of precise prior beliefs.

However, although traditionally conceptualized as a binary distinction between belief-confirming versus -disconfirming information

Figure 1
Schematic Illustration of the Belief Updating Process in Therapists



Note. Precision can refer to both the reliability of new information and the confidence afforded to prior beliefs. Their balance critically determines the extent to which a prior belief is updated in light of new information.

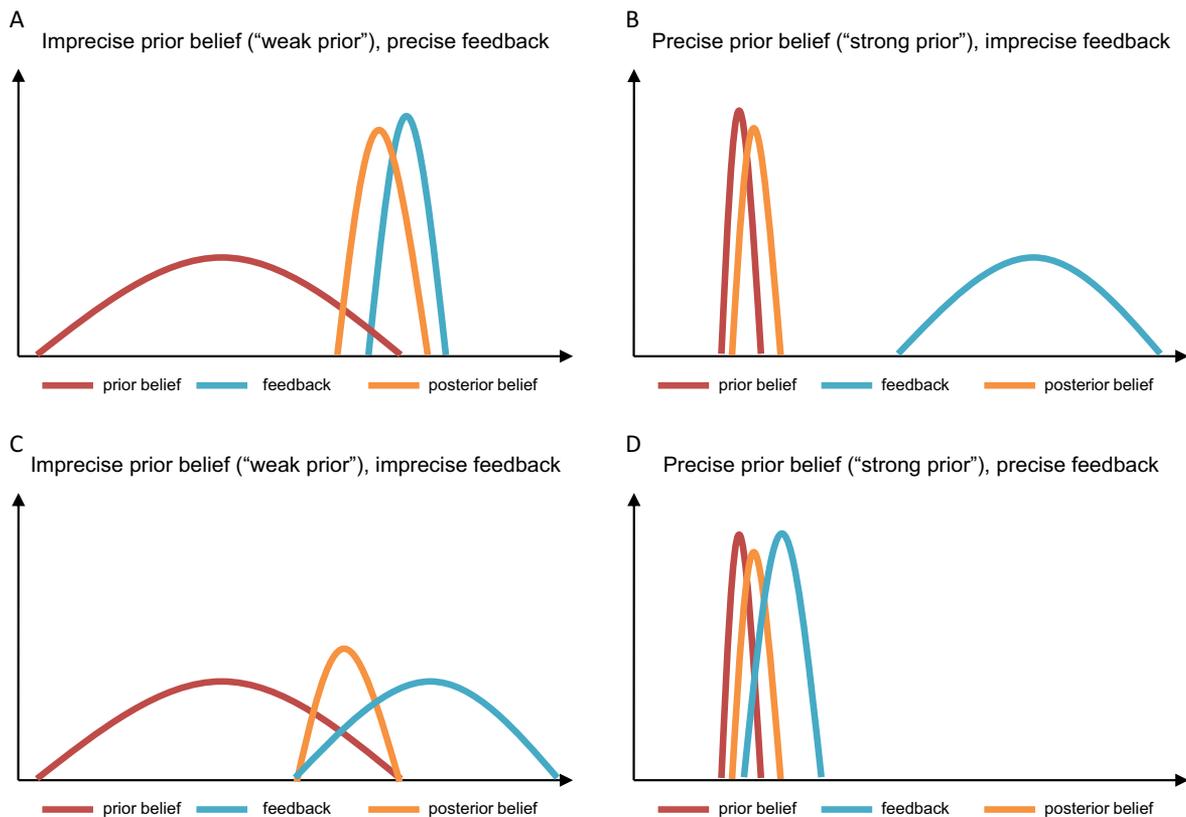
(Rief et al., 2015), it has recently been suggested that the magnitude of the “prediction error” influences the degree of belief change (Rief & Joormann, 2019). Contrary to the assumption of a linear relationship between the magnitude of the prediction error and the degree of belief update (Craske et al., 2014), there might be a critical tipping point of the mismatch between prior belief and new information according to recent experimental work on perceived social interactions: If the discrepancy between a belief and new information is too large, belief change decreases (Kube, 2023; Kube et al., 2022). These studies are consistent with the hypothesis of an inverse U-shaped relationship between belief update and the magnitude of the prediction error: Specifically, new information was considered most valid if it was moderately positive, whereas extremely positive information (i.e., new information that deviates to a large extent from people’s prior beliefs) raised doubts about the credibility of new information and led people to engage in defensive cognitive strategies (e.g., cognitive immunization) to devalue this extremely positive information.

Biases in Belief Updating

Research suggests that both healthy people and people with particular mental disorders are prone to certain biases when updating their beliefs such as a failure to take information into account that disconfirms one’s own view, resulting in the persistence of beliefs (Kube & Rozenkrantz, 2021). Several factors influence how people decide whether to integrate or reject new information. An important feature is the valence of information (desirable vs. undesirable). That is, people update (self-relevant) beliefs to a greater extent when new information conveys good news than when it conveys bad news (Sharot & Garrett, 2016). Applying this well-established “good news/bad news effect” (Garrett & Sharot, 2017; Lefebvre et al., 2017; Sharot et al., 2011) to the context of the receipt of feedback on treatment progress, this means that unfavorable information (e.g., such as feedback on a patient at risk for nonresponse) is discounted and is given little weight when updating a belief relative to desirable information (e.g., such as feedback on small symptom improvement in some areas). This selectivity in integrating new information depending on its valence implies that optimism (e.g., a therapist’s optimistic beliefs about a patient’s response to psychotherapy) can be maintained despite negative information that disconfirms the therapist’s prior beliefs. Thus, the mechanism underlying this so-called “optimism bias” is an asymmetric integration of new information, which can lead to an underestimation of risks and hence to the failure to take measures to prevent ultimate treatment nonresponse or deterioration—as seen in overly optimistic clinicians’ judgments (Kaiser et al., 2022).

In line with the optimistically biased update of beliefs about future life events, people’s risk estimates also often do not align with the evidence available to them: A recent study showed that (motivated) reasoning to rationalize away unwanted evidence (e.g., “I’m a good therapist, thus these statistics do not apply to me”) is not required for bad news (such as evidence suggesting that their patient is at risk for nonresponding is higher than they thought) to be discounted as compared to good news (Kappes & Sharot, 2019). Also, healthy people tend to discount information that undermines past choices and

¹ Beliefs can also be unconsciously conceptualized by the emerging field of computational psychiatry and neuroscience.

Figure 2*Schematic Illustration of the Precision-Weighting Process*

Note. If the prior belief is afforded low precision (referred to as “weak priors”), new information afforded high precision (“precise feedback”) has much influence on the formation of the posterior belief (A), but only moderate influence in case of imprecise feedback (C), while the opposite is true for “strong priors” regardless of feedback accuracy (B + D). If therapists are unsure about how much they can trust their beliefs, they prefer to rely on new information, provided that new information appears sufficiently accurate and credible. See the online article for the color version of this figure.

judgments: In fact, people fail to use the strength of others’ disconfirming opinions (e.g., information on a not-on-track patient provided by feedback) to alter confidence in judgments, but adequately use it when opinions are confirmatory, leaving people less likely to alter opinions in the face of disagreement—a phenomenon known as confirmation bias (Kappes et al., 2020). Of note, the motivation to hold a certain belief (vs. another) decreases the need for supporting evidence (Gesiarz et al., 2019), such as the belief of being a good therapist. Moreover, people face sometimes conflicting goals: on the one hand, they strive to form (a) accurate beliefs (e.g., “For this individual patient, I probably need to change my therapeutic style”) to inform clinically useful decisions, and on the other hand, (b) desirable beliefs (e.g., “I’m a good therapist for most of my patients”) that they value for their own sake (Bromberg-Martin & Sharot, 2020). As information is often unlimited, a decision has to be made as to when the data are sufficiently strong to reach a conclusion, judgment, or decision. Indeed, clinical decision making is a very crucial psychotherapeutic competence that can be informed by feedback.

Furthermore, there are individual differences in information-seeking behavior with the value of information that leads to information-seeking versus avoidance (Sharot & Sunstein, 2020).

Recently, information-seeking was highlighted in belief updating research with three diverse motives: people assess whether information is useful in directing action, how it will make them feel, and whether it relates to concepts they think of often. In other words, people seek information with the goal of improving their affect, level of certainty, and decisions. While people integrate these assessments into a calculation of the value of information that explains information-seeking or its avoidance, different individuals assign different weights to these three factors when seeking information (Kelly & Sharot, 2021). Therapists’ motivational approach to work (prevent failure vs. achieve success) and the perceived match with their organization influence their attitude toward outcome monitoring and outcomes (de Jong & de Goede, 2015), possibly mediated by making different information-seeking choices. Indeed, people accurately predicted the impact of information on their internal states (e.g., affect and cognition) and external outcomes (e.g., material rewards), and use these predictions to guide information-seeking choices. By balancing considerations of the impact of information on affective, cognitive, and material outcomes when seeking knowledge, participants became happier, more certain, and made better decisions when they sought information relative to when they did not, suggesting that the actual consequences of receiving

information aligned with their subjective expectations (Cogliati Dezza et al., 2022). Moreover, anxiety amplified the tendency to seek information more in response to large changes in the environment—also in case the cause of the anxiety was not directly related to the information sought (Charpentier et al., 2022). In feedback research, a study evaluating prospectively the TTN—a clinical decision support system in psychological treatments—found that therapist symptom awareness and therapist attitude and confidence were significant predictors of outcome as well as therapist-rated usefulness of feedback was a significant moderator of the feedback–outcome and the not on track–outcome associations (Lutz et al., 2022). Related to the information-seeking literature, therapists seeking to prevent failures (prevention focus) achieved slower symptom reduction in at-risk cases but had a more positive attitude toward outcome monitoring feedback, while therapists seeking to achieve success (promotion focus) achieved faster symptom reduction after receiving feedback regardless of their attitude (de Jong & de Goede, 2015).

Applying Research on Belief Updating to the Integration of Feedback Among Therapists

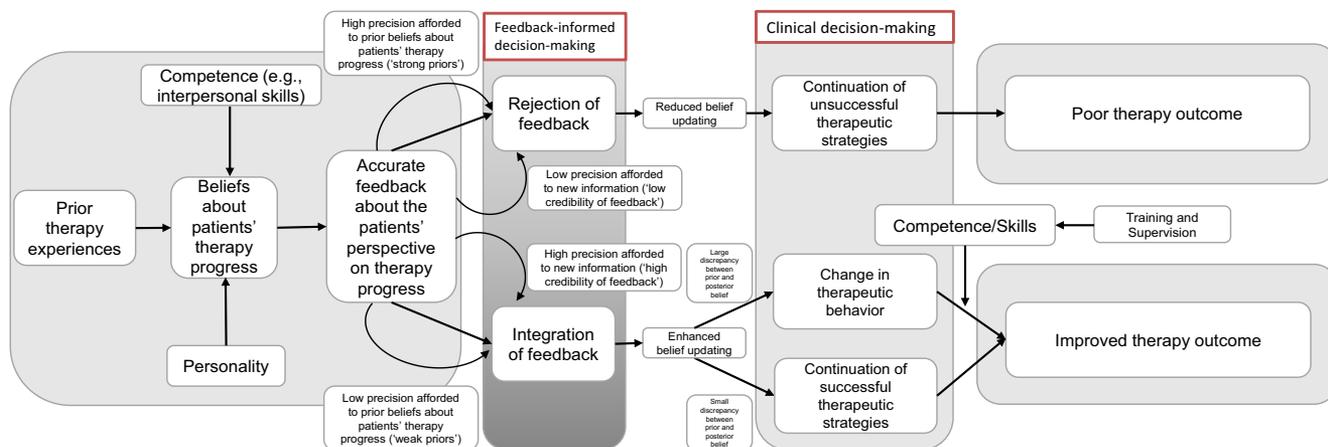
Linking the two previously disparate lines of research, we next recast the feedback–outcome literature through the lens of a belief updating model (see Figure 3). In this model, we conceptualize belief updating as a complex, dynamic, contextualized, and continuous intratherapist process over time with gradually updating one’s beliefs and initiating therapeutic changes to make optimal treatment adjustments (ranging from continuation of successful therapeutic strategies to dramatic changes in therapeutic behavior). As such, the intratherapist belief updating process is not exclusively related to time-invariant therapist factors, but rather incorporates time-invariant trait-like as well as dynamic state-like aspects.

Considering therapists’ beliefs about treatment progress, we propose that prior experiences of successful and unsuccessful psychotherapeutic treatments—or assumptions about them in the case of

psychotherapy trainees — lead to the development of certain beliefs about therapy progress in general and for a specific patient in particular. In addition, beliefs about treatment progress (e.g., on a basic level therapists view of the patients’ symptom distress at a time in treatment) may be shaped by therapists’ actual competencies and skill sets (e.g., competent delivery of a specific intervention that is assumed to be relevant in the further treatment process or dealing with interpersonal challenging situations in treatment), as well as their personality factors, such as therapists’ self-confidence (that are also influenced by desirable general beliefs such as “I’m a good therapist for most of my patients” that they value for their own sake) or own level of uncertainty tolerance. As a result, therapists have certain beliefs (i.e., “priors”) about the therapy progress of a given patient (e.g., “This patient’s symptoms will continue to improve”). When subsequently receiving accurate feedback on the actual treatment progress (e.g., by assessing the symptomatic distress every session with adequate measures), this can confirm (i.e., continued symptom reduction) or disconfirm (i.e., discontinuation of symptom reduction) the therapist’s prior belief. In other words, feedback information can contain desirable versus undesirable information which highlights a concordant versus deviant perceived distress in patient and therapist ratings. The feedback received may or may not be used to update the therapist’s belief, while therapists strive in general to refine their “predictive models” of themselves (e.g., their competencies) and the world (e.g., psychotherapy outcome of a given patient).

So, the crucial question is what determines whether therapists use feedback on treatment progress to alter their beliefs, particularly in the event where the feedback is discrepant from the therapists’ own perception of the treatment progress, keeping in mind the biases mentioned above (i.e., optimism and confirmation bias). In addition to this valence dependency, this might also depend on therapists’ information-seeking behavior that is driven by the goal of improving their affect, level of uncertainty and decisions with different therapists assigning different weights to these three factors when seeking information (Kelly & Sharot, 2021). According to the literature on belief updating, the degree to which therapists update their beliefs depends

Figure 3
Portrayal of the Belief Updating Approach to Feedback Research



Note. Belief updating is considered as a complex, dynamic, contextualized, and continuous intratherapist process over time with gradually updating one’s beliefs and initiating therapeutic changes to make optimal treatment adjustments (ranging from continuation of successful therapeutic strategies to dramatic changes in therapeutic behavior). See the online article for the color version of this figure.

on the relative weight the therapist assigns to their prior beliefs and the feedback received (i.e., the degree of precision). If therapists give the feedback on the treatment progress more weight (e.g., in case of perceived accurate feedback from a credible source) than their own assessment of it, feedback is likely to be integrated. We assume this process of integrating new information (i.e., new information provided by feedback) to be a necessary condition for feedback to result in effective treatment adaptation by therapists, ranging from continuation of successful therapeutic strategies to dramatic changes in therapeutic behavior.

Considering that existing PROM and feedback systems usually provide more than one score to therapists and were sometimes even derived by multiple scales measuring different construct, therapists' are put into a situation where they need weight new information against each other to make clinical decisions, especially when the different scores disagree with each other (Redmayne et al., 2023). Our model proposes that small discrepancies between the prior and posterior belief (i.e., high degree of overlap between therapist's beliefs and accurate feedback) on some dimensions (as indicated by scores on scales) likely lead to the continuation of some successful therapeutic strategies, while large discrepancies between prior and posterior belief on other dimensions likely lead to a change in other therapeutic strategies. Thus, the latter case can set the stage for therapists to search for or suggest to the patient alternative strategies they can try. Some feedback systems integrate information about the potential problem areas responsible for the lack of treatment response. For example, the CST (Whipple et al., 2003) which are part of the OQ-analyst (Lambert et al., 2003) assesses problems with regard to the therapeutic relationship, social support, life events, and motivation. Based on these assessments, therapists gain a better idea about potential problems (and thus how to change their therapeutic behavior that is likely to be more effective). Of course, in order for this information to be readily translated into effective actions which prevent treatment failure, therapists need the necessary competence and skills to provide appropriate adaptations of the treatment (Rief, 2021), while these can reliably be increased through instructor-led and self-guided web-based training and additional supervision (Henrich et al., 2023). However, for this adaptation process to be initiated, therapists need to update their beliefs about how the patient is doing and will be doing if the treatment is proceeded as originally planned. This is why belief updating can be seen as the necessary precondition for feedback usage.

On the other hand, therapists may be hesitant to integrate progress feedback if they value their prior beliefs over the feedback received. This may result from two sources: First, it is possible that therapists place overly much confidence in their own views (i.e., prior beliefs) and therefore ignore or disregard disconfirmatory feedback. For example, a therapist who believes to be one of the most talented psychotherapists (i.e., personality factor) or/and has made the (subjective) experience in the past that most of their patients benefit from their treatment approach may refuse to integrate feedback which suggests that their patient does not make as much progress as assumed. As a result, the therapist may falsely conclude that they can continue with the treatment as initiated. Ultimately, such a misconception of treatment progress may result in poor treatment outcomes despite the receipt of progress feedback.

Alternatively, feedback is likely to be ignored if therapists assign little weight to it (i.e., low precision). For instance, this may be the

case if therapists question the value of progress feedback in principle, doubt the particular patients' ability to have insight into their psychopathology, and/or have little competence in interpreting it. Relatedly, in order to reduce the discrepancy between their prior beliefs and the feedback received, therapists may be inclined to use defensive cognitive strategies to devalue discrepant, undesirable feedback, for example, by thinking, "The way the treatment progress was assessed does not quite capture what I think is really important to my patient." This cognitive devaluation of belief-disconfirming information has been referred to as cognitive immunization, meaning that through dismissing contradictory evidence, people's beliefs can become immune to updating and learning from new experience (Kube et al., 2020; Rief et al., 2015, 2022). Considering the above-mentioned tipping point from the suggested inverse U-shaped relationship between prediction error magnitude and degree of belief update, these cognitive defensive strategies are supposed to be stronger in case of an overly large mismatch between prior belief and new information, leading to decreased belief updating (Kube, 2023; Kube et al., 2022). Either way, if feedback is given little weight, therapists are likely to refuse it and may continue with the therapeutic strategies they think are adequate—even though the feedback would suggest to adjust the therapeutic behaviors. This sort of ignorance may prevent a self-critical reflection on one's therapeutic behavior and may thus explain why some therapists benefit from feedback more than others, which may ultimately hinder improved treatment outcomes despite the provision of progress feedback.

Although (healthy) people in general respond quite rationally to the presentation of new evidence (Tappin & Gadsby, 2019; Tappin et al., 2020; Wood & Porter, 2019), they have the propensity to integrate desirable and confirmatory information more than undesirable and disconfirmatory information as discussed above. This optimistic and confirmatory update bias may be one of the reasons for why some therapists fail to take sufficient account of feedback that, in fact, questions their therapeutic success. In essence, according to the "optimism bias," therapists may be inclined to integrate desirable feedback over undesirable feedback, hence overestimating the success of their therapeutic approach.

Quantifying Belief Updating in Routine Care

There are several ways to quantify belief updating in the context of feedback research in psychotherapy. Belief updating can be assessed *directly* by repeatedly asking therapists to rate the amount of credibility they afford to their patients' ratings as well as to rate their confidence (i.e., certainty) that their own rating (i.e., belief) is correct. Given the additional burden of this approach for therapist, it is also possible to *indirectly* infer the amount of belief updating if therapists as well as patients provide repeated assessments of patient progress. Belief updating should be reflected in the effect of the patient's rating of treatment progress on the therapist's rating of treatment progress that is made after therapists received feedback of patient ratings. Depending on the number of available assessments of patients and therapists, dynamic structural equation modeling (DSEM; Asparouhov et al., 2018) or the random intercept-cross-lagged panel model (RI-CLPM; Hamaker et al., 2015) might be appropriate statistical models to adequately model this effect on the within-patient-level controlling for autoregressive effects in both variables. Within-patient effects have the advantage to be not confounded by stable patient or

therapist characteristics. In the context of feedback research, it might be that patients with higher levels of interpersonal problems rate their progress worse than patients with lower levels of interpersonal problems and that this is also reflected in the therapist's ratings. This effect of interpersonal difficulties could result in a spurious effect of patients' progress ratings on subsequent postfeedback therapist ratings. For effects estimated at the within-patient level, all stable characteristics can be ruled out as potential alternative explanations of the observed effect.

To make sure that this effect is attributable to the feedback and not to the therapists' ability to adequately perceive changes in their patients' progress, it would be necessary to observe therapists in conditions in which they receive feedback for some patients and no feedback for other patients. Therapists for which the cross-lagged effect of the patients' ratings on their subsequent own rating are higher if they receive feedback compared to when they do not receive any feedback seem to show higher levels of belief updating because of the feedback (assuming random assignment and adequate sample size of patients per therapist). Following our theoretical considerations above, therapists who show higher levels of belief updating in the feedback condition should benefit more from feedback. Having said that, for therapists who are well aware of their patients' progress, feedback does not qualify as "new contradictory information" and thus should result in improved outcomes. This is in line with recent findings showing that feedback reduces the gap between low and high-performing therapists (Delgado et al., 2022). This convergence may be in part by leveling therapists' differential ability to accurately track their patients' progress—an ability which has been shown to be positively related to treatment outcome (Bar-Kalifa et al., 2016).

Discussion

The present account is the first to apply research on belief updating to provide a theoretical framework to explain the effects of progress feedback in the context of psychotherapeutic treatments. Briefly, we assume that therapists who are on average more influenced by the ratings of their patients' benefit more from feedback, underlining differential feedback effects between therapists. In line with the basic assumptions of the CFIT (Sapyta et al., 2005), we specify conditions of the (dis-)integration of feedback into the therapist's belief system. By providing a coherent explanation for these systematic differences between therapists in their tendency to be influenced by their patients' rating (via feedback), our account provides a theoretical model for several findings of psychotherapy feedback research and stimulates future research in this regard.

Implications for the Training of Therapists and Provision of Feedback

Some implications for clinical practice can be directly drawn from our account: First, beliefs about therapy progress of a given patient should be constantly checked by supervisors by considering the individual competence level, personality of the trainee, and level of training indicated by prior therapy experience (advanced vs. beginner). In case of strong beliefs about the therapy progress, trainees should be made aware of potential biases and encouraged to be open to weigh in new contradictory evidence and to empirically examine the credibility of one's beliefs with the aim to correct overly optimistic beliefs and, ultimately, pave the way for an enhanced

belief updating. Thus, it is important for clinical training to strike a balance between supporting trainees in building appropriate confidence (i.e., precision) in their ability to judge patient progress (i.e., prior beliefs) and on the other hand making them aware of the importance of self-reflection and proneness to several biases, both leading ultimately in fewer mismatches (i.e., higher predictability and certainty in therapeutic environment). Second, feedback about the patients' progress should contain new information with high precision (i.e., accuracy) from a credible source, for example, by data-informed monitoring and feedback systems to provide measurement-based care. By sampling precise empirical evidence (i.e., monitoring patient-reported outcomes and providing accurate feedback), therapists might enhance their predictability of the treatment (and patients' trajectory by internally having "nearest neighbor" patients) and reduce uncertainty in their beliefs. In this context, a special emphasis should be put on the credibility of the feedback source. There are two ways to determine the veracity of the new information: the perceived credibility of the source and direct evaluation via first-hand evidence, that is, testing the advice against observation. Beliefs are interpreted in light of the perceived credibility of the source in form of credibility-led biased interpretations of evidence (whether belief or suspicion confirming) that lead to further polarization of the perceived credibility highlighting the crucial role of credibility in belief updating (Pilditch et al., 2020), while cues including valence and relevance influence these credibility judgments suggesting a utility-credibility-trade off during decision making (Gugerty & Link, 2020). Therefore, creating a more nuanced credibility picture of the feedback system (i.e., strengths and weaknesses) and the information provided (e.g., by providing also confidence intervals of a given score) might also be a promising target. Furthermore, after providing feedback, the beliefs of the trainees should be checked again (e.g., by asking how they processed the feedback, if at all, and how this feedback will influence their clinical decision) to verify that belief updating has taken place, and what they consider how to translate their (updated) belief into therapeutic action (i.e., changes in the therapeutic behavior), aiming to enhance the active use of feedback to ultimately improve treatment outcomes of their patients.

Limitations and Future Directions

Although the present account is the first to explain the feedback process in terms of belief updating, we apply one set of theoretical assumptions to explain a fairly complex process. In this regard, several limitations must be taken into consideration.

First, the provision of accurate feedback is an important assumption of our model that feedback can be beneficial for treatment outcomes: Of note, the feedback itself is not infallible and highly dependent on the source of information (e.g., observer-rated vs. self-rated data, patients' report or video-based supervision) with standardized PROM measures being one source. Therefore, one rather general limitation of our account is that we focus solely on feedback by information derived from patient-reported questionnaires—although our model could theoretically also be applied to other forms of feedback than those receiving from standardized PROM and feedback systems, for example, feedback from a supervisor using video-taped sessions. Acknowledging that PROM systems provide only one, yet usually valid, source of information, there is reason to assume, however, that multiple sources of information (e.g., taking stock of patient's utterances, body language, referrals

and notes from other providers, and observations in the waiting room) continuously shape therapists' beliefs about a patient's therapy progress on a micro-level, and therapists need to weight dynamically multiple sources of information against each other. Important to note, self-report assessment of treatment outcome generated by standardized PROM measures does not always correspond to patients' report of treatment outcome (De Smet et al., 2020; McElvaney & Timulak, 2013; Stänicke & McLeod, 2021). In addition to patient-reported questionnaires, future research should investigate which other relevant sources of information (e.g., patient and supervisor reports) could be integrated into feedback systems to provide a multidimensional perspective and therefore a more accurate feedback on a patient's well-being. Noteworthy, our aim was not to develop a comprehensive theory clinical decision making and judgment, but rather to provide a framework that can explain certain specific aspects of the differential effects of feedback. Moreover, although inaccurate feedback likely diminishes this effect, this aspect should not substantially explain the between-therapist differences, as it is unlikely that certain therapists systematically treat more of those patients for whom the feedback is not reliable. Nevertheless, improving the accuracy of feedback in light of the source should be considered as an equally important future research step to further refine our model. Relatedly, feedback should generally be considered as a multidimensional rather than a unitary phenomenon with symptom change and treatment recommendations being two aspects, as also emphasized by the distinction between performance versus formative feedback in the CFIT (Sapyta et al., 2005). Therefore, the feedback itself (symptom change vs. treatment recommendation) in combination with how the accuracy of the information provided by feedback can be increased (e.g., by integrating multiple valid and reliable sources of information and increasing the predictive power of the treatment recommendation) are particularly promising lines of research. Second, there are no standardized assessment tools to measure a key element of our account; namely, prior beliefs about therapy progress and the degree of precision afforded to them. Thus, our theoretical propositions still need to be empirically tested in future work, preferably using rigorous experimental designs. Third, there is also a need for a reliable and valid measure to assess the credibility of feedback from the therapists' perspective. Fourth, it should be noted that the effects of feedback on treatment outcome are probably caused by multiple factors: A necessary factor could be the lack of acceptance of feedback and, relatedly, reduced belief updating as discussed in our model. Another factor, though, might be the lack of ability of the clinician to integrate the feedback; that is, to effectively adapt their approach after receiving the feedback that their patient is not doing as well as expected. For example, competencies—in particular, specific skills to handle negative developments and change one's treatment approach—could modulate whether feedback is successfully used. Our model focused primarily on how to improve the lack of acceptance by explaining why belief updating is a necessary condition, but we acknowledge that future research should equally focus on how to build the required abilities (i.e., competencies and skills) or investigate the additional information needed (e.g., CST which point the therapist in the direction of why their patient is not benefitting; Whipple et al., 2003) to use this feedback adequately by translating it into effective therapeutic behavior—a sufficient condition to improve treatment outcome. As feedback research is closely linked to the training of psychotherapists, the provision of observable and practically implementable

feedback on clinicians' competence (e.g., by training and supervision) could be key in this regard. In fact, competencies can be (moderately) increased through instructor-led and self-guided web-based training, especially when targeting specific and highly structured treatments or skills, and additional supervision reliably improves both therapist competence and patient outcomes (Henrich et al., 2023). Furthermore, Henrich et al. (2023) found that the level of prior training and experience of a therapist predicts the strength of training-related gains in competence. Moreover, though therapists are an essential part of the rather complex feedback-outcome process, therapists themselves (i.e., their beliefs and competencies/skills) are in turn only one explanatory factor in determining whether feedback improves treatment—assuming that patients provide valid information with their item responses when completing the questionnaire. Our proposed model focuses on the intratherapist part of feedback, that is, the therapist factors that affect openness to feedback. However, other important patient-related, interpersonal, and contextual factors outside of the therapist itself also play an important role in affecting the feedback-outcome relationship. For example, another explanation could be that feedback can affect patients directly (e.g., by encouraging self-assessment). Above that, nontherapist factors like systemic features of the mental health care service system and key patient characteristics (e.g., patients' attitudes toward feedback, diagnosis, motivation to accurately answer the items of the questionnaire) might be in play: Systemic implementation factors are a major determiner of feedback effects, and patient-related variability in psychotherapy outcome is usually greater than therapist-related variability, not to mention any interactive or collaborative factors (including but not limited to the alliance), which feedback has sometimes been shown to affect and be moderated by (e.g., Brattland et al., 2019). Lastly, there is reason to assume also differential effects related to treatment type or modality (e.g., psychodynamic vs. cognitive-behavioral treatments, different phases of treatment, or long-term vs. short-term treatments). Yet, our model supports that the integration of feedback into the therapists' beliefs is a prerequisite for the feedback to have an effect on treatment outcome. Future research should approach the complexity of this feedback-outcome relationship by rigorously investigating the factors we highlighted and their interplay, as well as other possible explanatory factors. After accumulating evidence over time, our model can be updated by integrating the most robust factors to explain the complex effects of feedback on treatment outcome.

Nevertheless, we believe that belief updating has the potential to inspire future research targeting the provision of feedback (e.g., by increasing its credibility) but also allows to derive some novel hypotheses about factors of therapists who benefit from feedback with the aim to develop interventions that may contribute to an increased use of feedback for those who do not benefit so far by improving belief updating. As our account puts a specific emphasis on the therapists' side, we believe that our framework might also facilitate research on therapists' training (e.g., by improving supervision processes).

For an overview of specific hypotheses that can be derived from our account, see Table 1.

The list of specific hypotheses we derived is not exhaustive, but we hope that they can inspire researchers and guide future research endeavors in this aspirational and vital field that has the potential to connect basic cognitive science theories and applied clinical

Table 1
Testable Hypotheses for Future Feedback Research

Hypothesis	Empirical examination
The higher the degree of perceived credibility of the received feedback, the more therapists update their beliefs in response to feedback on treatment progress. This effect on therapists' belief updating is moderated by the degree of confidence afforded to their own prior belief.	An empirical study examining prepost changes of beliefs after receiving credible versus noncredible new information (by precise/accurate vs. imprecise/inaccurate feedback) in dependence of the confidence afforded to prior beliefs. Empirical studies investigating different forms of feedback (e.g., unstructured, inaccurate vs. validated research-driven sophisticated feedback systems with accurate feedback) on belief updating.
Belief updating is a necessary precondition for therapists to be able to benefit from feedback: The more therapists update their beliefs about treatment progress in response to feedback, the more they adjust their therapeutic behavior, leading to improved outcomes.	An empirical study examining the relationship between therapists with enhanced versus reduced belief updating, changes in their therapeutic behavior and treatment outcome. An empirical study investigating interventions targeting belief updating and its associations with changes in therapeutic behavior and treatment outcome.
There is an inverse U-shaped relationship between the magnitude of the prediction error and the degree of belief update: The larger the discrepancy between the therapists' view of progress and the patients' view of progress, the more belief updating and thus more likely feedback will be helpful. This holds only to a specific tipping point: if the mismatch between a prior belief and new information is too large, belief change decreases.	An empirical study investigating the association between the discrepancy in therapists' and patients' ratings of patient progress with treatment outcome in feedback versus no feedback condition.
The better therapists are able to perceive changes in their patients without feedback, the less they benefit from feedback.	An empirical study investigating a therapist's ability to accurately assess patient progress as a moderator of therapist-level feedback effects (i.e., the differential outcome of a therapist depending on whether they receive feedback for a patient or not).
Feedback has the highest effects if it highlights potential discrepancies between the patient's and the therapist's perspective.	An empirical study comparing different forms of feedback. For example, feedback that directly visualizes a therapist's rating together with a patient rating versus feedback in which only the patient's ratings are provided.

science research in a way that new findings from belief updating research can further stimulate new hypotheses in feedback research. Noteworthy, some hypotheses (e.g., "The better therapists are able to perceive changes in their patients without feedback, the less they benefit from feedback") relate fairly well to prior theories such as CFIT (Sapyta et al., 2005) upon which our account is based. By expanding on the role of prior beliefs, the precision afforded to them and the interplay with the information provided by feedback (i.e., precision weighting process), we derive also hypotheses with specifying conditions for phenomena that go beyond the assumptions made by previous theories (e.g., "The higher the degree of perceived credibility of the received feedback, the more therapists update their beliefs in response to feedback on treatment progress. This effect on therapists' belief updating is moderated by the degree of confidence afforded to their own prior belief").

Conclusions

In this article, we introduced a belief updating account of feedback research in psychotherapy to elucidate the question under which conditions progress feedback improves treatment outcomes in psychotherapy. We proposed that progress feedback and its (dis-)integration into the therapist's belief system is closely related to both prior beliefs about the therapy progress and the precision afforded

to them. In essence, we suggested that a therapist's competence, personality, and prior therapeutic experiences precipitate the formation of those prior beliefs. As a basic tenet of this account, we argued then that (accurate) feedback can be rejected in two cases: either high precision is afforded to prior (yet overly optimistic) beliefs about patients' therapy progress ("strong priors") or low precision is afforded to new information ("low credibility of feedback") that leads to a distorted belief updating, the continuation of (unsuccessful) therapeutic strategies and poor treatment outcome. This account can explain both intra- and interindividual differences of the (dis-)integration of progress feedback, and, ultimately, gives insight into how progress feedback may lead to improved outcomes. Not only yields this framework the potential to enhance our understanding of how feedback works but also provides hints for developing interventions (i.e., design of feedback delivery to be effective, supervisory interventions to outweigh prior too-optimistic beliefs) targeting an enhanced belief updating in therapists to improve clinical decision making—especially for those not integrating relevant new information of their patients into their therapeutic judgments and thus not benefitting from feedback so far.

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