Feedback, the various tasks of the doctor, and the feedforward alternative

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OBJECTIVES This study aims to alert users of feedback to its dangers, explain some of its complexities and offer the feedforward alternative.

METHODS We review the damage that feedback may cause to both motivation and performance. We provide an initial solution to the puzzle of the feedback sign (positive versus negative) using the concepts of promotion focus and prevention focus. We discuss additional open questions pertaining to feedback sign and consider implications for health care systems.

RESULTS Feedback that threatens the self is likely to debilitate recipients and, on average, positive and negative feedback are similar in their effects on performance. Positive feedback contributes to motivation and performance under promotion focus, but the same is true for negative feedback under prevention focus. We offer an alternative to feedback – the feedforward interview – and describe a brief protocol and suggestions on how it might be used in medical education.

CONCLUSIONS Feedback is a double-edged sword; its effective application includes careful consideration of regulatory focus and of threats to the self. Feedforward may be a good substitute for feedback in many settings.

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INTRODUCTION

Feedback interventions (FIs), which provide people with information regarding their task performance, are one of the most widely applied psychological interventions. Some FIs are formal and some are less so. Examples of formal FIs include grades in school, teaching evaluations at universities, performance appraisals in the workplace, and customer satisfaction surveys in marketing departments. In parallel, teachers, educators, supervisors and doctors routinely provide information regarding conduct, abilities and achievements to their students, subordinates and clients. These practices beg the question of whether or not FIs improve performance.

The typical answer to this question during the 20th century was affirmative. This was the received wisdom from the inception of research into this question in 1905[1] until the mid-1990s. For example, in the field of industrial and organisational psychology, it was believed that 'the positive effect of FI on performance has become one of the most accepted principles in psychology'.[2] However, a comprehensive meta-analysis of largely laboratory experiments cast serious doubt on this conclusion.[1] This meta-analysis suggested that, although FIs improve performance by 0.4 of a standard deviation on average, FIs reduce performance in over a third of the experiments. In searching for the moderators (the conditions that make feedback more or less effective), the authors found, among other things, that the more threatening the feedback to the self (e.g. 'the task on which you will receive feedback predicts how well you will do in the rest of your career'), the more likely it is to debilitate performance. Surprisingly, however, the threat to self does not stem merely from failure. Specifically, Kluger and DeNisi[1] found no evidence that FI effects are moderated by FI sign. That is, negative FIs (information about failure) and positive FIs (information about success) do not differ, on average, in their effects on performance.[1] In summary, the meta-analysis suggests that FIs can impair performance and that the processes through which FIs affect performance require better explanation. In this paper, we present a better explanation for one key feature of FIs – the feedback sign – and offer one alternative to feedback – the feedforward interview[3] – that may achieve the goals of the FI without threatening the self.

THE FEEDBACK SIGN

In an effort to solve the puzzle of the feedback sign, Van Dijk and Kluger[4,5] suggested that the effects of feedback sign on motivation depend on both the chronic and the situational regulatory focus.[6] According to Higgins' self-regulation theory,[6,7] people have two regulatory foci: prevention (a state of mind characterised by vigilance and concern with punishment), and promotion (a state of mind characterised by eagerness and concern with rewards). We predicted and found that when prevention regulatory focus is activated (e.g. by asking people to imagine working in a job because they *have to*), negative feedback motivates participants more than positive feedback (e.g. they report that they will invest more effort in their job), whereas when promotion regulatory focus is activated (e.g. by asking people to imagine working in a job because they *want to*), positive feedback motivates participants more than negative. Before detailing the combined effect of regulatory focus and feedback sign on motivation and performance, we briefly elaborate on the difference between prevention focus and promotion focus by drawing on self-regulation theory.

Self-regulation theory

Higgins[6,7] noted that the idea that people are motivated to approach pleasure and avoid pain is well accepted, but that it was previously thought to be a unitary system. By contrast, Higgins[6,7] proposed that people have two basic self-regulation systems. The prevention system regulates the avoidance of pain or punishment, whereas the promotion system regulates the achievement of pleasure or reward. The prevention system involves goals that are experienced as necessities, obligations and things people feel they have to do because failing to do them might be painful. Such goals, for example, include arriving on time at a meeting, following a procedure for client referral, submitting an expenditure report, etc. By contrast, the promotion system involves goals that are experienced as wishes, desires and things people feel they want to do because succeeding in doing them might be pleasurable. Such goals, for example, include exploring a novel idea for a medical procedure, voluntarily performing medical work for underprivileged patients, improving one's skill in a hobby, etc. The difference between the prevention and promotion foci reflects the basic conflict between the drive to preserve the status quo and the drive to initiate change, or between the need for security and the need for self-actualisation.[6,8] To put it in everyday words, we can distinguish between things we do because we 'want to' (promotion) and things we do because we 'have to' (prevention).

Regulatory focus and the reaction to feedback sign

How do the different regulatory systems react to success versus failure, or the feedback sign? Commonly, positive feedback, or success, produces positive feelings, and negative feedback, or failure, produces negative feelings. However, Higgins[6] demonstrated that success under the promotion focus produces feelings that are not only positive but are characterised by high arousal (e.g. feeling happy), whereas success under the prevention focus produces feelings that are positive but are characterised by low arousal (e.g. feeling relaxed). Conversely, failure under the promotion focus produces discouragement (low arousal), whereas failure under the prevention focus makes people feel tense (high arousal).[9] For example, a successful outcome in medical research (promotion focus) will lead to happiness, whereas a successful outcome in a routine surgical procedure (prevention focus) will lead to relief. However, a failure in medical research will lead to disappointment, whereas a failure in a routine surgical procedure will lead to stress.

High arousal emotions, whether in promotion or prevention focus, are likely to reflect high motivation in comparison with low arousal situations. This is because arousal is a sign that a special effort or action should be made. This aspect of Higgins' theory led us to hypothesise that the promotion focus, with its concern with approaching pleasure and reward, will be further mobilised by positive feedback that signals that the object of desire is within reach and that more rewards may be available with additional effort. In parallel, we hypothesised that the prevention focus, with its concern with avoiding pain and punishment, will be further mobilised by negative feedback that signals that the cause of pain or additional potential punishment is present and needs to be dealt with. By contrast, in the case of positive feedback in the prevention condition, the signal indicates no eminent punishment and hence effort to avoid punishment can cease. Similarly, in the case of negative feedback in the promotion condition, the signal indicates poor likelihood of obtaining a reward and hence no further effort to gain the reward need be wasted and, again, effort can cease.

For example, if your administrator tells you that all your accident reports (activating your prevention focus) are messy (negative feedback) and create the risk that you will be subject to legal action, you will be likely to become hypervigilant and act to remedy the situation. By contrast, if the same administrator tells you that your reports are very well organised, you will relax and are unlikely to do anything further with this information. Yet, if, for example, your administrator tells you that your initiative (activating your promotion focus) was very well received by the hospital director (positive feedback), you will very probably become eager to meet the director, to consider additional ways in which your initiative can be demonstrated and perhaps more actively will seek to generate new and improved ideas. By contrast, if the administrator tells you that the very same initiative was disapproved, you will be likely to be dismayed and perhaps drop it altogether.

These straightforward examples are offered for the sake of clarity, but the fundamental point is that we expect to find an interaction between the regulatory focus and the feedback sign in their effect on motivation. Specifically, we predict that positive feedback will increase motivation and performance under the promotion focus, but debilitate motivation and performance under the prevention focus. For negative feedback, we predict the opposite: it will increase motivation and performance under prevention focus, but debilitate motivation and performance under promotion focus.

Review of evidence for the regulatory focus–feedback sign interaction

This prediction was repeatedly supported in our various earlier studies,[4,5] in which promotion and prevention foci were conceptualised both as chronic and situational variables. Specifically, in our first set of experiments,[5] we presented research participants with a hypothetical scenario and requested them to estimate whether they would increase or decrease their effort after receiving feedback.

Situational regulatory focus was manipulated by telling half of the respondents to imagine they were working in a job they *had to keep* because they were afraid of being left without income (prevention focus). The second half were asked to imagine they were working in a job they had always *desired to have* and that they wished to develop and advance in that job (promotion focus). Feedback sign was manipulated by telling half of the respondents that their boss had just told them they had *failed* in their task performance and the other half that their boss had told them they had *excelled* in their task performance. Motivation (after the feedback) was assessed with one item to be rated on an 11-point scale: 'Relative to your effort thus far, how much effort do you intend to exert next?' This intention to invest effort was significantly higher after either positive feedback in

the promotion condition or negative feedback in the prevention condition relative to negative feedback in the promotion condition or positive feedback in the prevention condition.

In the second experiment[5] we moved out of the laboratory and presented working people with a similar hypothetical scenario in which feedback sign was experimentally manipulated but regulatory focus was measured as a chronic individual difference. To measure chronic regulatory focus, we used three different operationalisations. The first was based on values, which were measured with a shortened version of Schwartz's value instrument known as the Schwartz Portrait Questionnaire.[10] We divided the participants into three groups on the basis of two median splits. The 'Promotion' group included people who were both high on values of self-direction and stimulation and low on values of security and conformity. The 'Prevention' group included people who were both high on values of security and conformity and low on values of self-direction and stimulation. The 'Undetermined' group consisted of a smaller group of people who were either high or low on both sets of values. The second operationalisation of chronic regulatory focus was based on occupation. Occupations can be classified, according to Holland's model of vocational interest,[11] into six categories, four of which are clearly tied to regulatory focus both theoretically and empirically.[12,13] Specifically, promotion focus seems evident in occupations classified by Holland as Artistic and Investigative (in our sample these included music teachers, copywriters, organisational consultants, researchers, and research and development workers). Prevention focus seems evident in occupations classified by Holland as Realistic and Conventional (in our sample these included secretaries, book-keepers, accountants, technicians and manufacturing workers). Finally, we operationalised chronic regulatory focus with respondents' motives for holding their current jobs. Specifically, respondents were asked to specify why they had chosen their current job in an open-ended question. Their answers were classified into two groups: Promotion motives included reasons such as self-actualisation, interest, challenge and 'I love my job', and prevention motives included reasons such as security, economic reasons, physical condition and 'I don't have a choice'. The feedback manipulation and the motivation measure were identical to those used in the previous experiment.

With each of these three operationalisations of chronic regulatory focus, we found the expected effect of feedback sign. Specifically, positive feedback caused higher motivation than negative feedback when participants: (i) held high self-direction values and low security and conformity values; (ii) were in Artistic or Investigative occupations, and (iii) held their jobs out of desire. By contrast, negative feedback caused higher motivation than positive feedback when participants: (i) held high security and conformity values and low self-direction values; (ii) were in Realistic or Conventional jobs, and (iii) held their jobs out of necessity. Interestingly, the group whose values could not be clearly identified as chronically in either promotion or prevention focus was not affected, on average, by the feedback manipulation, which further supports our operationalisation of regulatory focus with values.

Tasks as determinants of regulatory foci and their interaction with feedback sign

To increase our confidence in the above results and to expand theoretically the construct of situational regulatory focus, we designed another set of experiments.[4] The first goal of these experiments was to demonstrate that different tasks induce different situational regulatory foci and hence positive feedback will be more effective for 'promotion' tasks and negative feedback will be more effective for 'prevention' tasks. Secondly, we wanted to demonstrate that the effects obtained with measures of hypothetical motivation could be generalised to measures of actual performance.

To advance our theoretical expansion of self-regulation theory, we argued that certain tasks activate prevention focus, whereas others activate promotion focus. Tasks requiring vigilance – such as identifying objects on a radar screen, detecting errors in company reports, cleaning – keep individuals focused on finding what is wrong and what they should avoid (suspicious objects, errors, dirt, respectively). Therefore, as a result of their nature, these tasks produce prevention focus. By contrast, tasks requiring eagerness – such as seeking out new ideas, initiating organisational changes, developing innovative products – focus on finding what is right and what might be gained (ideas, changes, innovations, respectively). Therefore, these tasks produce promotion focus. Thus, schematically, promotion-focused tasks require eagerness, creativity and openness, whereas prevention-focused tasks require vigilance, attention to detail and adherence to rules.

To demonstrate this possibility, we ran a pre-test in which we asked managers to generate a list of typical tasks and then asked seven experts in regulatory focus

theory to classify the tasks to either promotion or prevention. Experts agreed on 21 out of 23 tasks and found 11 promotion tasks (e.g. generating ideas, creative problem solving, assimilating a new technology, challenging decision making, initiating changes), 10 prevention tasks (e.g. detecting errors, maintaining safety, book-keeping, work scheduling, quality control) and two undetermined (neutral) tasks (involvement in organisational politics, training employees).

The first set of experiments used the scenario methodology and manipulated three sets of promotion and prevention tasks and employed three separate samples. The first sample of Bachelor of Arts graduates were presented with scenarios that described working on an *error detection* (prevention) task or an *idea generation* (promotion) task. The second sample of undergraduate students from variable backgrounds were requested to imagine working on either a *safety project* (prevention) or a *career development project* (promotion). The third sample of medical interns were asked to imagine working on either *a drug control panel aimed at detecting errors in prescribing drugs for patients* (prevention) or *medical research aimed at improving the quality of patients' lives* (promotion). Feedback sign was manipulated by telling respondents that after 1 month they learned that 'thus far' their project was either failing or succeeding. Motivation (after the feedback) was assessed with one item to be rated on an 11-point scale: 'Relative to your effort on this project thus far, how much effort do you intend to exert next?'

To reap the benefit of using three independent samples, we ran two meta-analyses[14] of the simple effects of feedback sign: one for the promotion tasks, and one for the prevention tasks. Both meta-analyses supported our hypothesis. Specifically, for the promotion focus tasks, positive feedback yielded higher intention to invest effort than negative feedback; however, for the prevention focus tasks, negative feedback yielded higher intention to invest effort than positive feedback. In both meta-analyses we found no evidence for heterogeneity in effects, suggesting that the results were statistically similar in all three samples.

Finally, we submitted our hypothesis to a more stringent laboratory test based on actual performance. Specifically, we assigned students to work on either a prevention or a promotion task. The prevention task was to detect errors in a list of relatively simple, and solved, arithmetical calculations that required accuracy and attention to detail. An example item (which contains an error) is: $(+0.6) - (-0.8) - (+0.7) = 0.9$. The promotion task was to generate as many uses as possible for a particular object (e.g. a building block). For example, uses for a building block include a door stop, a stand for a planter, a base for shelves, a crude weapon and an athletic weight. This task required creativity and open-mindedness. The two tasks were presented by a computer program and the experiment was conducted in a computer laboratory. After working on the task for 10 minutes, participants were asked to pause and fill out a questionnaire. Meanwhile, the computer informed them that the program was now processing their task performance. After completing the questionnaire, the participants received bogus (and randomly assigned) normative feedback. The feedback appeared on the screen as one of these short messages: 'Up to now your performance on this task has been *above* average' and 'Up to now your performance on this task has been *below* average'. Participants were then asked to engage in the task again, and pre- and post-feedback performance were measured by the number of errors detected by the participants on the error detection task, and by the number of uses suggested by the participants on the generating uses task. All performance scores were standardised to allow clear comparison across conditions. Finally, motivation was measured in a manner similar to that in all previous studies both before and after feedback.

As hypothesised, in the uses generation task (promotion focus), positive feedback was followed by an increase in performance and negative feedback was followed by a decrease in performance. By contrast, in the arithmetical calculation task (prevention focus), positive feedback was followed by a decrease in performance and negative feedback was followed by an increase in performance. A similar pattern of results was found for the motivation measure.

FEEDBACK (SIGN): DISCUSSION

Our works appear to have solved the mystery of feedback sign and to explain why neither positive nor negative feedback affects performance in a constant manner. Specifically, our works suggest that the benefit of either positive or negative feedback depends on regulatory focus. Yet, our findings, especially regarding negative feedback, are likely to be further qualified by at least two considerations. Negative feedback, on the basis of our work, should improve motivation and performance for prevention tasks, under prevention situations and for people

characterised by chronic prevention focus. At the same time, however, negative feedback may have detrimental effects that offset benefit such as those hypothesised and summarised in this article. Consider, for example, taking a course in statistics, which many people take because they have to (prevention focus), not because they desire to study the subject. Now, imagine that you fail the midterm examination. Your reaction may be complex. You may, as we predicted here, have a heightened concern with statistics, which will push you to try harder. Alternatively, ruminating thoughts ('perhaps I just cannot master statistics') may undermine your belief in your abilities. Belief in one's ability is labelled in psychology as self-efficacy, a construct that was found to predict actual performance on all types of task.[15] Suppose further that, despite the rumination and the threat to your self-efficacy, you increase your effort and work hard, but then also fail the next examination. This time, you may plunge into learned helplessness.[16] Thus, our theory and findings may be limited to initial reactions to negative feedback or to tasks for which failure is not likely to undermine belief in ability.

This additional complicating factor (belief in one's ability under prevention and promotion foci) must wait for further conceptual and empirical development. Practically, it demonstrates the complexity inherent in providing advice on how to use feedback. For example, to determine which type of feedback is appropriate, we need to know not only which regulatory focus is salient, but also which aspect of motivation (the urge to act or the belief in ability) is stronger in each situation in order to be able to suggest whether or not to use negative feedback. Even ignoring this complexity, issues remain to be resolved before we can determine how best to apply our findings in practice, as outlined next.

Implications for the health care system

One difficulty in implementing our findings in the workplace is that it is not always easy to identify a situation as relating solely to a promotion or prevention focus. A good example of a prevention and promotion mix is the health care system. Doctors, for example, are required to be aware of potential mistakes and errors and at the same time to think innovatively, to handle complex situations and to make relatively risky decisions. What will be the proper feedback strategy to help them improve their practice?

Although medical staff are faced with a mix of prevention and promotion foci, the community seems to emphasise error avoidance, risk management and the minimising of losses over creativity and other promotion-focused goals (although we realise there is a large literature on adaptive expertise and innovation that would appear to fit with promotion-focused ideals). To test this hunch, we ran a simple test of the frequency of the terms 'diagnostic error' and 'error reduction' in PubMed and identified over 90 000 references, which may be compared with the less than 60 000 references obtained when a similar search was conducted using 'creativity' and 'opportunity'. Clearly, this is a very coarse way of assessing the relative balance between prevention and promotion foci in the health professional community and countless contextual variables will influence an individual practitioner's focus in any particular situation. It is intriguing, however, to think about the impact that the common conversations taking place within the health professions might have on the general tendencies of practitioners to be prevention-focused (e.g. by altering their clinical behaviour because of the threat of malpractice liability)[17] or promotion-focused (e.g. by altering their clinical behaviour because of an inner drive to improve the client's health), and the impact this may have, in turn, on health care professionals' receptivity to feedback of different types. Given the increasing emphasis on professional regulation and the need to provide workplace-based assessments in an impactful and credible way, these issues may be worth exploring further.

What does this mean for practice? It implies not only that tweaking the amount of positive versus negative feedback is a very delicate endeavour, but that many other features of the feedback (e.g. trust in the source of feedback) may determine its effectiveness, a complexity that led Kluger and DeNisi to refer to feedback as 'a double-edged sword'.[18] One potential way to overcome the complexities associated with feedback is to transfer some of its key ingredients to a different practice that is not marred by the same problems. As it seems that the key ingredient of feedback is the creation of a discrepancy between a preferred standard and the actual state of affairs (for a theoretical review, see [1]; for a qualitative study describing this tension in medicine, see [19]), perhaps a non-feedback discrepancy-inducing technique known as the 'feedforward interview'[3,20,21] will prove to be beneficial.

THE FEEDFORWARD INTERVIEW

The feedforward interview (FFI) is a multi-purpose interview protocol designed to overcome some of the

limitations of feedback. The FFI is a theory-based modification of the appreciative interview component of appreciative inquiry theory and methods.[22] Before explaining the theory behind it, we describe the five steps of the FFI protocol (for a detailed protocol, see [3]).

The FFI protocol

Introduction

'I am sure that during your work [or your struggle with your disease or any other domain of inquiry] you have had both negative experiences and positive experiences. Today, I would like to focus only on your positive experiences.'

Story

'Could you please tell me a story that happened during your work [life] during which you felt full of life [happy, energised], even before the results of your actions became known?' Note that we emphasise 'before the results of your actions became known' to direct interviewees to consider cases in which the mere activity was good for them, regardless of organisational rewards or societal approval.

Peak

'What was the peak moment of this story? What did you think at the peak moment? How did you feel at that moment [including your physiological reaction]?'

The conditions (learning; inquiry)

'What were the conditions, in yourself, others and the organisation [physical, temporal] that allowed this story to happen?'

The feedforward question

'Recall the conditions that allowed you to feel alive [at work]. Consider these conditions as road signs or beacons that show you how to flourish [at work]. To what degree does your current behaviour [at work] or your plans for the immediate future take you closer to, or further away from, the conditions that allowed you to be happy [at work]?'

Comparisons of FIs with FFIs

Both feedback and the FFI appear to induce a tension between a standard (a goal) and some information pertaining to one's standing relative to the standard,[1,19] yet feedback focuses on external standards and performance information, whereas the FFI focuses on internal standards and performance information. Specifically, whereas typical feedback involves both an external standard of evaluation (e.g. what constitutes an A grade in a course is set by the instructor) and external information regarding the distance from the standard (e.g. the actual grade received), the FFI seeks to establish both an internal standard of excellence based on past performance and to generate internal information on the distance from the standard that currently exists or is expected to exist in the immediate future. That is, the FFI seeks to create a reflection process that firstly serves the interviewee and his or her needs.[23] To uncover an inner standard that supports a sustainable strategy of superior performance, the FFI emphasises the gleaning of a detailed story from the interviewee (use of episodic memory). Recalling a story that may be rare in one's work experience or in one's health history may reveal new data that are not stored in semantic knowledge (i.e. data that were not translated into a codified abstract theory of the person regarding his or her more chronic behaviour). This may create a novel insight regarding possible superior performance (increasing one's belief in the ability to perform) and a discrepancy that is likely to drive people to replicate and expand their best performance (simultaneously activating promotion focus and high self efficacy).

Evidence for FFI effectiveness

The evidence for FFI effectiveness is largely clinical, but some initial quantitative evidence is also available. Feedforward interviews have been used before typical performance appraisals in several corporations[3] and were shown to yield new insights for interviewing managers and to reduce resistance to performance appraisal and to 360-degree feedback from consultants.[3] In addition, the FFI was implemented as a key component in an organisation-wide, strength-based performance appraisal.[20] This appraisal was perceived by senior managers to both improve workplace relationships and supply insights, via aggregated ratings, into strategic challenges facing top management teams. One laboratory experiment showed the FFI to increase the perception of learning relative to that in a group engaged in the simple telling of positive and negative stories, and to increase positive activation (positive moods with high arousal) relative both to a group that only told stories and a control group that was not

involved in any dyadic interaction.[21] In another laboratory experiment, students were asked to consider the goals that were most important to them and rank them by importance (most respondents ranked achieving academic success first). Next, the students were administered either an FFI or an FI delivered by a fellow student, or were asked to reflect on their top-ranked goal. In the FFI condition, students were interviewed about a case or a situation in the past in which they had attained either the same (top-ranking) or a similar goal and had felt good during the process. In the FI condition, the interviewing student asked the interviewee about his or her goal and plans to achieve it and then provided both negative and positive feedback regarding the interviewee's plans for achieving the goal. Results indicated that the FFI increased, relative to the feedback and reflection conditions, the intention to pursue both the most important goal and the second most important goal, on which they were not interviewed.[21] In addition, the FFI interviewers felt higher self-efficacy and reported more learning than the feedback interviewers. Thus, it seems that, at the very least, the FFI can generate feedback-like processes that may positively affect performance (by enhancing the intention to pursue goals) and at the same time benefit the interviewer. Whereas the existing evidence is promising, additional theoretical and empirical work is needed to substantiate claims regarding the FFI. However, based on practical experience, we can consider the possible application of the FFI in medical education.

A proposal for using the FFI in medical education

There is a multitude of possibilities for utilising the FFI in medical education. Firstly, seasoned instructors could be interviewed by colleagues to generate peak stories from their careers. The conditions that emerge from those stories may point to critical prerequisites for excellence in medical practice, at both the individual (e.g. knowledge, curiosity) and system (e.g. good relationships with the patients, no time pressure) levels. Although some of the conditions to be discovered are very far from the common reality of the work of many doctors (e.g. absence of time pressure), exposing these conditions may highlight, for both students and the medical establishment, some of the ideal conditions that facilitate the delivery of excellent medical care. Indeed, a few FFIs we carried out with general practice doctors indicated that among the key factors that make doctors happy and proud (generating feelings of being 'full of life' at work) were building relationships with patients and having ample time. These conditions are standards that, if they are accommodated, may both support the doctor's well-being and facilitate the delivery of outstanding results, and prevent burnout and dissatisfaction.[24] The doctor and the establishment will then be faced with feedforward questions pertaining to how and to what extent their current practices, or their plans for the future, differ from the situational and personal factors that are believed to have yielded excellence in the past.

Another possible application refers to teaching medical educators to periodically interview their interns with regard to peak experiences. This may help interns to discover their own strengths and identify their career aspirations, and may prepare the ground for providing necessary feedback in a manner that does not threaten the self of the intern and in a way that builds, rather than destroys, his or her relationship with the mentor.

CONCLUSIONS

In this article, we have shown that the effects of feedback on motivation and performance are very complex and at times result in effects opposite to those intended. We offer a deeper understanding of people's reaction to feedback via the concepts of promotion and prevention. We show that positive feedback motivates more than negative feedback under a promotion focus and that this effect reverses under a prevention focus. To offset some of the risks associated with feedback without losing its key motivating principle, we offer feedforward and the FFI as a means to enhance performance within the health care system. Further exploration of the FFI is required, but the conceptual issues outlined here are likely to provide guidance regarding ways in which the efforts of educators and regulators can be maximally beneficial for both the individual clinician and the profession.

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REFERENCES

1 Kluger AN, DeNisi A. The effects of feedback interventions on performance: a historical review, a meta-analysis, and a preliminary feedback intervention theory. *Psychol Bull* 1996;**119** (2):254–84.
2 Pritchard RD, Jones SD, Roth PL, Stuebing KK, Ekeberg SE. Effects of group feedback, goal setting, and incentives on organisational productivity. *J Appl Psychol* 1988;**73** (2):337–58.
3 Kluger AN, Nir D. The feedforward interview. *Hum Resour Manage Rev* 2009;**20**:235–46.
4 Van Dijk D, Kluger AN. Task type as a moderator of positive/negative feedback effects on motivation and performance: a regulatory focus perspective. *J Organ Behav* 2010. In press.
5 Van-Dijk D, Kluger AN. Feedback sign effect on motivation: is it moderated by regulatory focus? *Appl Psychol* 2004;**53** (1):113–35.
6 Higgins ET. Beyond pleasure and pain. *Am Psychol* 1997;**52** (12):1280–300.
7 Higgins ET. Promotion and prevention: regulatory focus as a motivational principle. In: Zanna MP, ed. *Advances in Experimental Social Psychology*. San Diego, CA: Academic Press 1998;1–46.
8 Higgins ET. Making a good decision: value from fit. *Am Psychol* 2000;**55** (11):1217–30.
9 Higgins ET, Shah J, Friedman R. Emotional responses to goal attainment: strength of regulatory focus as moderator. *J Pers Soc Psychol* 1997;**72** (3):515–25.
10 Schwartz SH, Lehmann A, Roccas S. Multimethod probes of basic human values. In: Adamopoulos J, Kashima Y, eds. *Social Psychology and Culture Context: Essays in Honor of Harry C Triandis*. Newbury Park, CA: Sage Publications 1999;107–23.
11 Holland JL. *Making Vocational Choice: A Theory of Careers*. Englewood Cliffs, NJ: Prentice Hall 1985.
12 Sagiv L. Vocational interests and basic values. *J Career Assess* 2002;**10** (2):233–57.
13 Ackerman PL, Heggestad ED. Intelligence, personality, and interests: evidence for overlapping traits. *Psychol Bull* 1997;**121** (2):219–45.
14 Borenstein M, Hedges LV, Higgins JPT, Rothstein HR. *Introduction to Meta-Analysis*. Chichester; Hoboken, NJ: John Wiley & Sons 2009.
15 Stajkovic AD, Luthans F. Self-efficacy and work-related performance: a meta-analysis. *Psychol Bull* 1998;**124** (2):240–61.
16 Mikulincer M. *Human Learned Helplessness: A Coping Perspective*. New York, NY: Plenum Press 1994.
17 Studdert DM, Mello MM, Sage WM, DesRoches CM, Peugh J, Zapert K, Brennan TA. Defensive medicine among high-risk specialist physicians in a volatile malpractice environment. *JAMA* 2005;**21**:2609–17.
18 Kluger AN, DeNisi A. Feedback interventions: toward the understanding of a double-edged sword. *Curr Dir Psychol Sci* 1998;**7** (3):67–72.
19 Sargeant J, Armson H, Chesluk B, Dornan T, Eva K, Holmboe E, Lockyer J, Loney E, Mann K, van der Vleuten C. The processes and dimensions of informed self-assessment: a conceptual model. *Acad Med* 2010;**85** (7):1212–20.
20 Bouskila-Yam O, Kluger AN. Strength-based performance appraisal and goal setting. *Hum Resour Manage Rev* 2010 ;In press.
21 Rechter E. Emotional and cognitive reaction to feedforward intervention. 11th Annual Meeting of the Society for Personality and Social Psychology, 28–30 January 2010, Las Vegas, NV.
22 Cooperrider DL, Srivastva S. Appreciative inquiry in organizational life. In: Pasmore W, Woodman R, eds. *Research in Organization Change and Development*. Greenwich, CT: JAI Press 1987;129–69.
23 Boud D, Walker D. Promoting reflection in professional courses: the challenge of context. *Studies Higher Educ* 1998;**23** (2):191–206.
24 Zuger A. Dissatisfaction with medical practice. *N Engl J Med* 2004;**350** (1):69–75.

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