When and Why the Self-Concept Changes in Response to Self-Relevant Feedback

Inaugural-Dissertation

zur Erlangung des Doktorgrades der Philosophie

der Ludwig-Maximilians-Universität

München

vorgelegt von

Franziska Brotzeller

aus Würzburg

2026

Referent: Prof. Dr. Mario Gollwitzer

Korreferent: Prof. Dr. John Rauthmann

Tag der mündlichen Prüfung: 05.11.2025

Table of Contents

1 Danksagung

An dieser Stelle möchte ich mich bei allen Personen bedanken, die mich auf dem Weg zu dieser Dissertation begleitet und unterstützt haben. Mein besonderer Dank gilt meinem Betreuer, Prof. Dr. Mario Gollwitzer. Du hast mir die Möglichkeit gegeben, in einem unglaublich unterstützenden Umfeld zu forschen und mich dabei persönlich und fachlich weiterzuentwickeln. Danke für dein Vertrauen, für das Fachwissen und die Erfahrungen, die ich durch dich gewinnen konnte, und für deine Gelassenheit, die mir in schwierigen Zeiten Mut gemacht hat. Außerdem möchte ich mich herzlich bei den beiden weiteren Mitgliedern der Prüfungskommission der Verteidigung bedanken: Prof. Dr. John Rauthmann, der zugleich der Zweitgutachter dieser Dissertation ist, und Prof. Dr. Annabell Daniel. Mein weiterer Dank gilt meinem Ko-Autor Gideon Spägele für die tatkräftige Mitarbeit an Manuskript 2 dieser Dissertation.

Bei den aktuellen und ehemaligen Mitgliedern meines Teams am Lehrstuhl für Sozialpsychologie der LMU—Philipp Agostini, Dr. Marlene Altenmüller, Marina Dreisbusch, Katharina Dürmeier, Moritz Fedeneder, Dr. Moritz Fischer, Prof. Dr. Friederike Funk, Ye He, Dr. Lucas Köhler, Dr. Zoe Magraw-Mickelson, Dr. Alma Merscher, Stephan Nuding, Teresa Schenk, Dr. Johannes Schwabe, Jessica Söder, Dr. Mathias Twardawski, Marlene Voit, Dr. Marvin Walczok, Amelia Zein und Dr. Johannes Ziegler—bedanke ich mich für die angeregten Diskussionen über Forschung und die vielen schönen Momente außerhalb davon. Es ist nicht selbstverständlich, dass ein Team sowohl auf der fachlichen als auch auf der persönlichen Ebene so gut funktioniert und ich schätze mich glücklich, ein Teil davon sein zu dürfen. Insbesondere danke ich Marlene und Mathias sowie Lucas, Stephan, Philipp und Moritz Fi. für die hilfreichen Anmerkungen zu meinen Ideen und Entwürfen.

Zuletzt möchte ich mich bei allen Personen aus meinem privaten Umfeld bedanken, die mir in den letzten Monaten und Jahren den Rücken gestärkt und mich in meinem Vorhaben unterstützt haben. Euer Verständnis, eure Ermutigung und euren Optimismus weiß ich sehr zu schätzen. Besonders möchte

ich mich bei meiner Familie bedanken: Meinen Eltern Renate und Clemens Brotzeller danke ich für die stetige Unterstützung sowie die Mischung aus liebevoller Zuversicht und dem kritischen Blick aufs eigene Tun, die ihr mit mitgegeben habt. Meiner Schwester Teresa Brotzeller danke ich für das offene Ohr und die helfende Hand, mit der du mir jederzeit zur Seite stehst.

2 Statement of Authorship

This dissertation consists of an introduction, three manuscripts that are published or currently being prepared for submission in peer-reviewed journals (see below), and a general discussion. I hereby declare that the present dissertation is my own work, and that no sources/resoures were used other than those declared by me. For all three manuscripts, I received feedback from my co-author Mario Gollwitzer. For Manuscript 2, I additionally received feedback from my co-author Gideon Spägele.

Manuscript 1

Brotzeller, F., & Gollwitzer, M. (2024). Exploring asymmetries in self-concept change after discrepant feedback. *Personality and Social Psychology Bulletin*, 01461672241232738. https://doi.org/10.1177/01461672241232738

Manuscript 2

Brotzeller, F., Spägele, G. L., & Gollwitzer, M. (2025). I think, therefore I change: Reflection leads to self-concept change after discrepant feedback. *Personality and Social Psychology Bulletin*, 01461672251333466. https://doi.org/10.1177/01461672251333466

Manuscript 3

Brotzeller, F., & Gollwitzer, M. (2025). The role of demand effects in studying self-concept change after discrepant feedback. Manuscript in preparation.

3 Abstract

Feedback can convey self-relevant information to a person and lead to changes in their self-concept. This dissertation draws on theoretical approaches on changes in the self-concept and reactions to expectation-disconfirming information to contribute to the current understanding of when and why the self-concept changes in response to feedback. Furthermore, this dissertation provides insights into the role of demand effects in studying self-concept change after feedback. This dissertation includes three manuscripts covering nine empirical studies. Findings provide evidence that the self-concept changes more the larger the discrepancy between feedback and initial self-concept. Furthermore, changes in the self-concept were larger after negative compared to positive feedback, regardless of whether it was allegedly possible to improve on the self-concept domain or not. Findings furthermore suggest that reflection is important for self-concept change after discrepant feedback and that findings on feedback-induced self-concept change do not merely result from demand effects, although they played a role under specific conditions. I discuss theoretical implications as well as limitations of this research program and suggest avenues for future research.

Keywords: self-concept, self-concept change, feedback, negativity bias, reflection, demand effects

4 Introduction

Human beings are often confronted with information related to themselves. On a given day, a person might, for instance, receive a bad performance evaluation at work or be praised for being a good listener by friends and family. However, such self-relevant information does not always match what the person thinks about themselves. As the ability to think and form perceptions about oneself is considered a core feature and a fundamental need of human beings (Hattie, 1992; Stürmer, 2009), a growing body of theory and research has investigated when and why self-relevant experiences impact peoples' self-perceptions. Such self-perceptions constitute a person's self-concept (Shavelson et al., 1976) and are not merely an end in themselves: They shape people's behaviors as well as a number of affective and cognitive outcomes. Various domains of the self-concept have been linked, for instance, with affect and depression (Orth et al., 2008, 2012), relationship and job satisfaction (Judge & Hurst, 2008; Orth et al., 2012), the acquisition of education and academic achievement (Guay et al., 2003; Judge & Hurst, 2008; Marsh & Martin, 2011), and health-promoting behaviors as well as health problems (Judge & Hurst, 2008; Yarcheski et al., 2004). A nuanced understanding of the factors influencing the self-concept therefore does not only provide insights into the core human feature of forming self-perceptions, but it is also vital for contributing to positive life experiences and outcomes. However, we do not yet have a comprehensive understanding of when and why the self-concept changes. In the past, changes in the self-concept have often been studied in concert with other phenomena such as falling in love (Aron et al., 1995) or the trajectories of life outcomes (Orth et al., 2012). Such studies often focused on the relevance of these changes for the studied phenomena, neglecting the search for commonalities across situations in which the self-concept changes (Gore & Cross, 2014). This search has recently been taken up again, with a growing body of theory and empirical research investigating when and why self-relevant experiences lead to self-concept change across situations and domains of the self-concept (e.g., Gore & Cross, 2014; Krach et al., 2024; Wrzus & Roberts, 2017).

4.1 Conceptualizing the Self-Concept

In their early review of the topic, Shavelson et al. (1976) defined the self-concept as all perceptions a person holds about themselves. Paving the way for future conceptualizations, the authors identified several features they regard as central to the self-concept. They suggested that the self-concept is a *hierarchical* and *multidimensional* structure. Their theoretical idea was that within the self-concept hierarchy, the general self-concept at the apex is divided into several more specific dimensions on the next level of the hierarchy and that each of these dimensions is again made up of even more specific dimensions, with perceptions of the person's behavior in specific situations at the base of the hierarchy. They suggested that the multiple dimensions that are part of the self-concept function as a category system which helps organize a person's experiences and self-perceptions. The dimensions can differ between individuals, but often include aspects related to academic, social, physical, and emotional domains (Marsh, 2008; Shavelson et al., 1976). Much research has supported the idea of a multidimensional self-concept, showing that the dimensions of the self-concept are highly differentiated in their content, follow different developmental trajectories, and that outcomes are positively related to some but relatively unrelated or even negatively related to other dimensions (e.g., for academic achievement being related to academic but relatively unrelated to non-academic domains of the self-concept; Marsh, 2008; Orth et al., 2021). Research has also provided support for the hierarchical structure of the self-concept (Marsh, 1990; Mummendey, 2006), although findings suggest that the hierarchical structure is less pronounced than originally proposed (Marsh et al., 1988; Marsh, 2008; O'Mara, Marsh, et al., 2006). Nevertheless, many researchers today still share the idea of a multidimensional, hierarchical self-concept (Gore & Cross, 2014).

Shavelson et al. (1976) further suggested that the self-concept is *developmental*, becoming more differentiated and multifaceted through infancy, childhood, and adolescence, and that it is *stable*. They assumed that this stability is especially pronounced at higher levels of the hierarchy but decreases

at lower levels of the hierarchy. Since then, much research has investigated the stability of and changes in the self-concept, although a lot of early research focused on its development from infancy to adolescence as the self-concept was regarded as highly stable in adulthood (Hattie, 1992; Mummendey, 2006). This assumption was, however, challenged by several longitudinal studies showing mean-level and rank-order changes in the self-concept in young, middle, and late adulthood and across self-perceptions in a variety of domains such as the physical self-concept (e.g., McKinley, 2006), personality traits (e.g., Kandler et al., 2015; Mummendey & Sturm, 1982), and self-esteem (e.g., Kuster & Orth, 2013; Orth & Robins, 2014; Schafer & Keith, 1999). Based on these findings, the self-concept seems to be moderately stable but malleable even in adulthood (Bleidorn et al., 2021; Mummendey, 2006).

Importantly, much of the previous research has focused on (changes in) propositional representations of the self (i.e., the *explicit self-concept*), which are usually consciously accessible. Less research exists on (changes in) associative representations of the self (i.e., the *implicit self-concept*). These associative representations refer to assocations between the self and certain features or behaviors (e.g., personality traits, self-esteem; Back et al., 2009; Greenwald & Farnham, 2000; Perugini et al., 2021). While changes in the implicit self-concept are an interesting topic for future research, the present dissertation aims to advance the current understanding of when and why changes in the explicit self-concept occur and will therefore focus on theorizing and empirical research on the explicit self-concept. Thus, when the terms “self-concept” and “self-perception” are used in the following, they will, unless otherwise specified, refer to propositional representations of the self.

4.2 When and Why the Self-Concept Changes

To comprehensively understand changes in the self-concept, it is necessary to examine the momentary processes contributing to such changes. Everyday experiences during which an individual receives self-relevant information are thought to play an important role in producing changes in the self-concept (Mummendey, 1988; Shavelson et al., 1976; Wrzus & Roberts, 2017). During such an

experience, an individual might observe their own behavior in a specific situation, noticing a discrepancy to what they thought they would be like. This single self-relevant information might not be enough to impact this individuals' self-perception in a lasting way. If this individual, however, repeatedly observes themselves showing the same behavior across several situations, this can then lead to more lasting changes in their self-perceptions (Mummendey, 1988). For example, an individual might think of themselves as a rather introverted person who does not enjoy spending time with large groups of people. When this individual goes to a party and notices that they are energized by hanging out with the people there, this might deviate from what they would have expected of themselves and lead to changes in their self-perceptions. While these might be small, short-term changes at first, repeatedly making similar experiences might produce larger, more lasting changes in their self-perceptions. The idea that several experiences during which an individual receives consistent self-relevant information are necessary to produce lasting changes in self-perceptions is also reflected in a more recent approach from personality psychology, which posits that several self-relevant experiences during which an individual perceives changes in their thoughts, feelings, or behaviors can, over time, condense into changes in self-perceptions regarding their personality (i.e., the personality self-concept; Wrzus & Roberts, 2017). Shavelson et al. (1976) further argued that situation-specific self-perceptions at lower levels of the hierarchy should be easier to change than general, context-independent self-perceptions at higher levels of the hierarchy. In the example of the individual who considers themselves to be introverted, this might mean that the individual would more easily adapt their self-perceptions of being introverted regarding the specific situation they were in. They might, for instance, be quicker to conclude that they enjoy birthday parties from close friends than to change their self-perception of being a generally introverted person.

Apart from observing their own behavior in a new situation and subsequently inferring information on what they are like from this observation (Bem, 1972), there are several other ways for an

individual to acquire self-relevant information: They might compare their achievements to those of others to determine their relative standing compared to their peers (i.e., social comparison; Bosch & Wilbert, 2023; Suls & Wheeler, 2012). Alternatively, they might receive self-relevant information through direct or indirect feedback from other people (Mummendey, 2006). Two decades ago, Roberts and Caspi (2003) emphasized the importance of feedback as a source of self-relevant information and pointed out the lack of systematic, empirical studies on how feedback contributes to change. Research on the topic has since picked up and points towards feedback as an important predictor of (short-term) self-concept change (e.g., Elder et al., 2022; Korn et al., 2012; Kube et al., 2022). However, many questions still remain unanswered.

4.2.1 Coping with Discrepant Feedback

While feedback can take many forms, I conceptualize it as external, self-related information a person receives (cf. Gallrein et al., 2019, for a similar conceptualization with a stronger focus on the feedback sender and receiver). According to this definition, feedback includes self-related information given in a formalized and deliberate fashion, for instance in educational settings (Hattie & Timperley, 2007) or as part of a performance management process in the workplace (London, 2003), but it also includes information given informally and spontaneously during everyday life (Gallrein et al., 2019). While feedback might be given explicitly in many of these situations, self-related information can also be more subtle and implicit (e.g., when given via facial expressions or gestures). Some have excluded such types of self-relevant information from their conceptualizations of feedback as they might be more easily misinterpreted (Ashford & Cummings, 1983; Gallrein et al., 2019). While the empirical studies presented as part of this dissertation mostly focus on explicit feedback as well, I discuss the generalizability of the present findings to more subtle, implicit types of self-relevant information in section 8.2.1. Across the different contexts and formats in which it might be provided, self-relevant feedback can contain information regarding different domains of the self-concept, both at lower levels

of the hierarchy (e.g., regarding a specific behavior in a specific situation) or at higher levels of the hierarchy (e.g., regarding overarching abilities or traits a person possesses, or an evaluation of the person overall). Such information can either be in line with or discrepant from the current self-concept.

When a person receives discrepant feedback, this creates an aversive state due to the conflict between the new information and the current self-concept (Festinger, 1957; Panitz et al., 2021). There are different mechanisms through which an individual might alleviate this aversive state and cope with the discrepant information. One framework that can help understand responses to discrepant information is the model of Violated Expectations 2.0 (ViolEx 2.0 model; Panitz et al., 2021), which was inspired by previous theorizing by Brandstädter and Greve (1994) on dealing with self-discrepant information in the transition from middle to late adulthood. In the ViolEx 2.0 model, expectations are understood as conditional beliefs an individual holds about the probability of certain events, experiences, or information in the future (Panitz et al., 2021). An expectation violation occurs when an individual is confronted with information that is inconsistent with the original expectation. According to the ViolEx 2.0 model, an individual confronted with discrepant information can either change their original expectation to be consistent with the discrepant information (i.e., *accommodation*) or minimize the impact of the discrepant information (i.e., *immunization*). Alternatively, individuals can actively create situational outcomes that confirm their expectations or avoid outcomes that disconfirm them (i.e., *assimilation*). This has been discussed both as a proactive behavior shown in anticipation of a potential expectation violation or as a reaction to an experienced expectation violation (Brandtstädter & Greve, 1994; Panitz et al., 2021).

In the context of self-concept change after discrepant feedback, an individual's self-perceptions are associated with expectations for self-relevant outcomes. An individual might, for example, have a positive math self-concept and therefore expect to receive positive feedback on a math test. Aiming to confirm their self-concept, they might assimilate and spend a lot of time studying for the test. When

they are nevertheless confronted with discrepant information (e.g., worse-than-expected feedback on the test), they might immunize by minimizing the impact of the feedback and doubting whether the results were properly calculated, or they might accommodate by lowering their math self-concept in line with the feedback (i.e., self-concept change).

4.2.2 Factors Impacting Self-Concept Change After Discrepant Feedback

Consistent with these theoretical ideas, feedback does not always lead to (the same amount of) self-concept change. Research has, for instance, investigated which characteristics of the feedback, the feedback source, the self-concept domain, and the feedback recipient affect whether and how much the self-concept changes after a person has received feedback. Specifically, as a precondition for self-concept change after feedback, the feedback must be relevant to the respective domain of the self-concept (cf. McConnell et al., 2009). Investigating how basic features of the feedback impact self-concept change, several studies have found that larger discrepancies between the feedback and the initial self-concept in the respective domain are associated with more self-concept change (Binderman et al., 1972; Kube, Rief, et al., 2019; Swann & Hill, 1982). Further research shows, for example, that the credibility of the feedback source (Binderman et al., 1972), the centrality of the self-concept domain targeted by the feedback (Elder et al., 2022), the recipient's self-concept clarity (Guadagno & Burger, 2007), and interactions between the aforementioned and other factors (e.g., between the feedback discrepancy and depressive symptoms; Kube & Eggers, 2025) predict self-concept change.

One characteristic of the feedback that has recently received much attention for impacting self-concept change on its own and in conjunction with other factors is whether the feedback is positive or negative. Positive feedback has mostly been conceptualized as feedback that is better than the initial self-concept and negative feedback as feedback that is worse than the initial self-concept. A third case in which the feedback matches the initial self-concept exactly has often been disregarded in favor of

comparing the two former cases.[1] The present research also uses this conceptualization of positive and negative feedback and subsumes the two under the term "direction of discrepancy" (see section 8.2.2 for further thoughts on the conceptualization of "positive" and "negative" feedback). A majority of studies comparing the impact of positive and negative feedback has found that people change their self-concept more in response to positive than negative feedback. This has been demonstrated across many domains of the self-concept such as personality traits (Elder et al., 2022; Korn et al., 2012, 2014), intelligence (Eil & Rao, 2011; Möbius et al., 2022), or physical appearance (Eil & Rao, 2011) and under different conditions (e.g., for feedback based on a performance test or on a social interaction; Eil & Rao, 2011; Korn et al., 2012). Such asymmetric self-concept change during which positive feedback is overweighed compared to negative feedback has been referred to as a positivity bias (e.g., Elder et al., 2022; Koban et al., 2017; Korn et al., 2012). Consistent with theorizing on positivity biases in belief updating in general, positively biased self-concept change has been discussed as an adaptive strategy aimed at maintaining positive self-views (Elder et al., 2022; Sharot & Garrett, 2016). In line with this idea, the positivity bias in self-concept change has been found to be less pronounced in individuals with mental health symptoms or disorders that are associated with negative self-views (e.g., social anxiety and depressive symptoms; Elder et al., 2022). One study has even found that individuals with social anxiety display a reversed bias, with negative feedback impacting the self-concept more strongly than positive feedback (i.e., negativity bias; Koban et al., 2017). However, this pattern of negatively biased self-concept change has also been found in several studies with non-clinical samples (Ertac, 2011; Müller-Pinzler et al., 2019; Zamfir & Dayan, 2022). Compared to the studies demonstrating a positivity bias, negatively biased self-concept change was only demonstrated under narrow conditions:

[1] Some have used slightly different conceptualizations of positive and negative feedback (e.g., see Möbius et al., 2022).

Participants repeatedly indicated their self-concept while performing and receiving feedback on several trials of a performance task (Ertac, 2011; Müller-Pinzler et al., 2019; Zamfir & Dayan, 2022). It is so far unclear whether a negativity bias in self-concept change also occurs under different conditions.

Apart from studies on the effects of positive and negative feedback, motivational processes impacting self-concept change have received much attention. Four prevalently discussed motivational processes are *self-assessment*, *self-verification*, *self-enhancement*, and *self-improvement* (Sedikides & Strube, 1997). They are thought to impact how self-relevant information is perceived, processed, and recalled (Sedikides & Strube, 1997; Wrzus & Roberts, 2017) and might thus help explain findings on positively and negatively biased self-concept change. While the self-assessment motive might be less relevant in explaining these biases as it describes motivational processes aimed at obtaining accurate self-perceptions (Sedikides & Strube, 1997), the other motives have been discussed as drivers of biased self-concept change.

Individuals motivated to self-verify aim to confirm their existing self-concept through their experiences to increase the perceived coherence and predictability of the world (Swann, 1983). In line with this motive, studies have shown that individuals seek feedback that is consistent with their existing self-concept, even if it is undesirable (Swann & Read, 1981). García-Arch et al. (2024) have suggested that this motive might provide an explanation for biased self-concept change: Individuals with a positive initial self-concept might be positively biased in changing their self-concept after discrepant feedback, while those with an initially negative self-concept might display the opposite bias. Findings from a study by Eil and Rao (2011), however, contradict this explanation as they show a positivity bias for all participants regardless of their initial self-concept.

As an alternative explanation for the findings on positively and negatively biased self-concept change, Müller-Pinzler et al. (2019) argued that motives for self-enhancement and self-improvement might color how individuals perceive and weigh such feedback. When an individual is motivated to self-

enhance, they aim at increasing the positivity of their self-concept and protecting it from negative information (Sedikides & Strube, 1997). Self-enhancement processes might therefore lead to positive feedback being overweighed compared to negative feedback. When an individual is motivated to self-improve, they aim at bettering themselves (Sedikides & Strube, 1997). This might mean that negative feedback is overweighed compared to positive feedback if it is perceived as more informative for how to improve. This only makes sense, however, when it is possible to improve on the respective domain of the self-concept. Müller-Pinzler et al. (2019) therefore argued that perceiving the self-concept domain as unimprovable or fixed can trigger self-enhancement processes as negative feedback is particularly threatening in this case. They further argued that perceiving the domain as malleable or improvable can trigger self-improvement processes and induce a focus on negative feedback. The authors suggested that previous studies on self-concept change after discrepant feedback might have inadvertently conveyed whether it is possible to improve on the respective self-concept domain via aspects of the study design (e.g., repeated trials of a task suggesting an opportunity for improvement) or the domain (e.g., beauty or intelligence being perceived as rather fixed). This might explain the differing patterns of asymmetric self-concept change found in these studies. This explanation, however, has not yet been empirically tested.

4.2.3 Reflection as a Mechanism of Change

While biased self-concept change after positive and negative feedback and potential explanations for it have been investigated in many recent empirical studies, some other factors that might be involved in self-concept change after feedback have received less empirical attention. This is the case for reflection, which has been suggested as a central psychological mechanism underlying self-concept change (Wrzus & Roberts, 2017).

Generally, self-awareness (i.e., focusing attention on the self; Morin, 2011; Silvia & Duval, 2001) is regarded as central in identifying, processing, and storing information about the self. The state of self-

awareness can include thinking about different aspects concerning the self, such as one's emotions and traits or one's past and future (Morin, 2011). Furthermore, self-awareness can induce processes of self-evaluation during which the self is compared against certain standards (e.g., perceptions of what correct behavior should look like; Silvia & Duval, 2001). Self-awareness includes different types of self-focused attention, among them self-rumination and self-reflection. While self-rumination refers to an anxious, repetitive self-focus, self-reflection has been described as a healthy interest or curiosity toward the self (Trapnell & Campbell, 1999) that is necessary for learning about the self (Gibbons, 1983; Morin & Racy, 2021). This is consistent with theoretical accounts on reflection emphasizing its importance in contrasting new information with and potentially integrating it into existing beliefs (Rogers, 2001).

The importance of reflection for self-concept change is further emphasized in one theoretical model on personality development, the TESSERA framework (Wrzus & Roberts, 2017). According to this framework, reflective processes are the main pathway through which everyday self-relevant experiences lead to changes in the personality self-concept.[2] These everyday experiences are described as TESSERA sequences including a triggering situation ("T") that induces an expectation ("E") for how to behave, think, or feel in the situation. This is followed by a state or a state expression ("SSE") the person shows, which elicits an internal or external reaction ("RA"). A person behaving in a certain way and then receiving self-relevant feedback is one example of such an external reaction to a state expression. Reflecting on the self-relevant experiences can include remembering and evaluating them as well as contrasting them with the person's current personality self-concept. In case of discrepancies between the two, reflective processes can result in changes in the personality self-concept to reduce these discrepancies (Wrzus & Roberts, 2017). Although the framework mainly focuses on the personality self-

[2] The TESSERA framework also covers changes in implicit personality, which are not relevant in the present context and will therefore not be further discussed.

concept, the authors argue that it should also apply to other domains of the self-concept. This is consistent with the literature on self-awareness as well as other theorizing on narrative identity and wisdom, which emphasize that reflection is important for gaining self-knowledge and adapting one's self-views in all domains of the self-concept (Glück & Weststrate, 2022; McAdams & McLean, 2013; Pals, 2006; Silvia & Duval, 2001).

Thus, reflection is a process during which individuals cognitively engage with self-relevant experiences and it is theorized to be an important mechanism of self-concept change. However, when reflecting on a self-relevant experience, self-concept change is not the only way to resolve potential discrepancies between a self-relevant information one has received and the self-concept: An individual receiving discrepant feedback might, in line with the different mechanisms of coping with discrepant information (see section 4.2.1), immunize by discrediting the feedback source or assimilate by planning to change their future behavior (Brandtstädter & Greve, 1994; Panitz et al., 2021). Such reactions can render self-concept change unnecessary and even stabilize the current self-concept (Wrzus & Roberts, 2017). Therefore, reflecting on self-relevant information does not necessarily lead to self-concept change.

Empirical research on whether and under which conditions reflection is a mechanism for change is sparse (Miller, 2020; Quintus et al., 2021). The most direct evidence on the role of reflection in self-concept change stems from a study on long-term personality change: Across a period of several months, reflection was relevant only for changes in self-perceptions regarding one of the Big Five traits (Quintus et al., 2021). Thus, this study did not provide strong evidence for reflection as a pathway to self-concept change. Further research is thus necessary to determine whether and under which conditions reflecting on a self-relevant experience leads to self-concept change. It is possible, for example, that reflection is especially relevant as a pathway to self-concept change for certain types of self-relevant information: Positive and negative information are remembered and processed differently (Unkelbach et al., 2020;

Wrzus, 2021). As negative feedback can be threatening to the self (Hakmiller, 1966), it might be met with defensive strategies. Thorough and elaborate reflection might help in counteracting such strategies and might therefore be especially important for self-concept change after negative compared to positive feedback.

4.3 Studying Self-Concept Change After Discrepant Feedback

When studying self-concept change after discrepant feedback, most researchers have used a methodological approach enabling them to examine how few or even single instances of receiving self-relevant feedback impact a person's self-concept: They employed a design in which participants' self-concept regarding one or several domains was assessed before and after receiving feedback on these domains (e.g., Bosch & Wilbert, 2023; Koban et al., 2017; Korn et al., 2012, 2014, 2016; Kube et al., 2022; Kube, Glombiewski, et al., 2019; Kube, Rief, et al., 2019; Kube & Glombiewski, 2021; Müller-Pinzler et al., 2019). The feedback was based on participants' behavior or performance during a task that was completed as part of the study (e.g., a social interaction, speech, or estimation task; Koban et al., 2017; Korn et al., 2012; Müller-Pinzler et al., 2019) and was often manipulated in accordance with the respective research question (e.g., Kube et al., 2022; Müller-Pinzler et al., 2019). This enables researchers to systematically test how certain factors impact self-concept change after feedback while ensuring that the feedback directly targets the self-concept domain of interest. Furthermore, most studies with this design used self-reports for assessing participants' self-concepts. They then examined differences in self-reports before and after the feedback as indicators of (short-term) self-concept change. While some have argued that it is also possible to infer a person's self-concept from behavioral observations, this can be misleading as the self-concept does not necessarily correspond to observable behavior (Hattie, 1992; Shavelson et al., 1976). Most researchers therefore rely on self-reports as a more direct measure of a person's self-perceptions (Mummendey, 2006).

Using self-reports for assessing a person's self-concept before and after they receive feedback might, however, produce demand effects that endanger the validity of a study's findings: When certain cues make participants aware of the research hypothesis, this can lead to changes in their responses (Coles, Gaertner, et al., 2023; Orne, 1962). Study designs in which the same measure is repeatedly assessed before and after an intervention can serve as such a cue: It might lead participants to deduce that changes in this measure are expected. Participants wanting to comply with this expectation might then adapt their responses to be hypothesis-confirming ("good subjects"; Orne, 1962). However, they might also provide hypothesis-disconfirming responses ("bad subjects" or "negativistic subjects") or not change their responses despite perceiving demand characteristics ("faithful subjects"; Orne, 1962; Rosnow & Aiken, 1973; Weber & Cook, 1972). It has been shown that how participants respond can vary considerably, although they, on average, respond in a hypothesis-confirming way (Coles, Wyatt, et al., 2023). However, if studies on self-concept change after discrepant feedback indeed produce demand characteristics that impact participants' self-ratings, changes in these ratings are no longer valid indicators of actual changes in participants' self-perceptions. The risk of demand effects might be even increased under certain conditions: Several studies have investigated whether larger discrepancies lead to more self-concept change than smaller discrepancies and have therefore presented participants with more or less discrepant feedback (Kube et al., 2022; Kube, Rief, et al., 2019; Swann & Hill, 1982). Receiving highly discrepant feedback might, however, be perceived as an even more salient cue that changes in self-ratings are expected, leading to even larger demand effects.

The potential role of demand effects in studies on self-concept change after discrepant feedback has been discussed by several researchers, with some using cover stories or excluding participants who guessed the purpose of the study to reduce the risk of such effects occurring (e.g., Kube, Rief, et al., 2019; Tao et al., 2025). It is unclear, however, whether they succeeded in doing so. So far, the role of demand effects in such studies has not yet been systematically investigated.

4.4 The Present Research Program

The present research program aims to contribute to a more detailed understanding of when and why discrepant feedback impacts the self-concept. More specifically, I systematically investigate conditions for and an underlying mechanism of self-concept change after discrepant feedback as well as a potential methodological concern when studying such effects.

Manuscript 1 focuses on one feature of the feedback shown to produce asymmetric self-concept change: the direction of discrepancy. Previous research has produced seemingly contradictory results, with some studies finding positively and others finding negatively biased self-concept change after discrepant feedback (e.g., Elder et al., 2022; Korn et al., 2012; Müller-Pinzler et al., 2019). Motives for self-enhancement and self-improvement indirectly targeted via the opportunity to improve have been suggested as one explanation for these different biases in self-concept change (i.e., a high opportunity for improvement should trigger self-improvement processes and a low opportunity for improvement should trigger self-enhancement processes). The goal of Manuscript 1 therefore was to explore under which conditions these biases occur and to test the potential explanation for the differing findings. To this end, I present four studies (total N = 1,438). In a first autobiographical recall study, I asked participants to recall the last self-relevant feedback they received and measured features of the feedback as well as participants' reactions to it, among them their intentions for self-concept change. In two subsequent studies, participants indicated their self-concept before and after receiving feedback on one or several tasks. Partially replicating the third study in a fourth study, I again assessed participants' self-concept before and after they received feedback but added a manipulation communicating to participants whether it is allegedly possible (vs. not possible) to improve on the targeted self-concept domain. Taken together, these studies examine the impact of positive and negative feedback on intentions for and actual self-concept change across different domains of the self-concept and test whether the opportunity for improvement underlies asymmetries in self-concept change. Furthermore,

they also further test the effect of the size of discrepancy between the feedback and the initial self-concept on self-concept change.

Manuscript 2 investigates the role of reflection in self-concept change after discrepant feedback. Reflection has been suggested as a mechanism through which self-relevant experiences lead to changes in the self-concept (Silvia & Duval, 2001; Wrzus & Roberts, 2017) and might be especially relevant after negative compared to positive self-relevant information. The goal of Manuscript 2 therefore was to empirically test these theoretical ideas in a fine-grained approach linking reflection on specific instances of self-relevant feedback to subsequent self-concept change. I present evidence from five correlational studies (total *N* = 2,422) and one experimental study (*N* = 1,149). In all studies, participants indicated their self-concept before and after receiving feedback. In the correlational studies, they additionally self-reported how much they had reflected. In the experimental study, I varied whether participants were encouraged to reflect via prompts or hindered from reflection via a cognitively demanding distractor task. All studies focused on different domains of the self-concept, thereby examining the relationship between reflection on discrepant feedback and subsequent self-concept change across these different domains.

Manuscript 3 focuses on a potential methodological concern when studying self-concept change after discrepant feedback: I investigate whether self-concept change found in studies that assess participants' self-concept before and after presenting them with feedback is produced by demand effects instead of actual changes in participants' self-perceptions. This is plausible as the study procedure might make participants aware of the researcher hypothesis and impact their responses. This risk might be increased when providing highly discrepant feedback to test for effects of the size of discrepancy. The goal of Manuscript 3 therefore was to examine whether the effect of discrepant feedback and, specifically, the effect of the size of discrepancy on self-concept change result from demand effects. To this end, I present two studies (total *N* = 957) in which I experimentally varied the

alleged researcher hypothesis. In the first study, I communicated to participants whether the researchers allegedly expected (vs. did not expect) to find self-concept change after discrepant feedback. In a third condition, no researcher hypothesis was communicated. In the second study, I varied whether the researchers allegedly expected the amount of self-concept change to depend (vs. not depend) on the size of discrepancy between feedback and initial self-concept. In both studies, participants were then asked to indicate their self-concept before and after receiving feedback. I further assessed participants' self-reported motivation to confirm or disconfirm the communicated hypothesis. These two studies enable examining the role of demand effects by testing whether the different researcher hypotheses communicated to participants, in combination with participants' motivation to (dis)confirm the hypotheses, impact subsequent patterns of self-concept change.

5 Manuscript 1: Exploring Asymmetries in Self-Concept Change After Discrepant Feedback

This manuscript has been published:

Brotzeller, F., & Gollwitzer, M. (2024). Exploring asymmetries in self-concept change after discrepant feedback. *Personality and Social Psychology Bulletin*, 01461672241232738. https://doi.org/10.1177/01461672241232738

Exploring Asymmetries in Self-Concept Change after Discrepant Feedback

Franziska Brotzeller[a] and Mario Gollwitzer[a]

[a]Department of Psychology, Ludwig-Maximilians-Universität München

Author Note

Franziska Brotzeller, Department of Psychology, Ludwig-Maximilians-Universität München; Mario Gollwitzer, Department of Psychology, Ludwig-Maximilians-Universität München.

We thank Veronika Fischer, Alina Kolb, Emma Runge, Vivian Swoboda, and Leonie Thürmer for their help in creating study materials and collecting data for Study 4. This research has been conducted without external funding.

The authors have no conflict of interests to disclose.

Correspondence concerning this article should be addressed to Franziska Brotzeller, Department of Psychology, Ludwig-Maximilians-Universität München, Leopoldstraße 13, 80802 Munich, Germany. Email: f.brotzeller@psy.lmu.de

Word count: 10.514

Abstract

Receiving self-relevant feedback that is discrepant from one's self-concept can lead to self-concept change. However, it is currently unclear whether positive or negative feedback has a larger effect on self-concept change. Across four studies (total *N*=1,438), we demonstrate that intentions for self-concept change (Study 1) as well as actual self-concept change (Studies 2, 3, and 4) are larger (a) for larger discrepancies between self-concept and feedback and (b) for negative compared to positive discrepancies. Exploring these effects further in Study 4, we find no evidence that the opportunity for improvement influences whether self-concept change is positively or negatively biased. In sum, the present research provides consistent evidence for a negativity bias in self-concept change, investigates a theoretical explanation, and discusses alternative explanatory approaches.

Keywords: self-concept, self-concept change, performance feedback, negativity bias

Exploring Asymmetries in Self-Concept Change after Discrepant Feedback

In everyday life, people often receive feedback about their traits, abilities, or physical appearance. Such feedback can be provided both in a formal setting (e.g., when receiving performance feedback at work) or in an informal setting (e.g., when being complimented on one's cooking skills at a private dinner party). In both settings, self-relevant feedback can shape people's self-concept, defined as a person's perception of themselves (Bem, 1972; Shavelson et al., 1976). However, the extent to which discrepant external feedback leads to changes in such self-perceptions (i.e., self-concept change) varies considerably: In some cases, receiving external feedback leads to self-concept change in accordance with the feedback, while, in other cases, even highly discrepant feedback does not lead to self-concept change. When receiving the feedback that one is a very good cook, for example, one might accept the feedback and adapt one's self-concept accordingly or one might attribute the successful dish to a very detailed recipe and stick to the belief that one is a mediocre cook. Although a considerable amount of research has examined self-concept change after self-relevant feedback, many unanswered questions remain.

Research in the areas of social and clinical psychology suggests that the extent to which people change their self-concept in accordance with the feedback they received depends, among other factors, on (a) characteristics of the source of the feedback (e.g., the expertise of the person giving the feedback), (b) characteristics of the receiver (e.g., their self-esteem), and (c) features of the feedback itself (e.g., the discrepancy between feedback and self-perceptions; see Binderman et al., 1972; Kernis & Goldman, 2003; Shrauger & Schoeneman, 1979). In the present research, we focus on the latter of the three features and examine the *size* of the discrepancy between one's self-view and the feedback one receives as well as the *direction* of the discrepancy—that is, whether the feedback is positive and suggests an upward adjustment of one's self-concept (e.g., "I obviously cook better than I thought I would") or whether it is negative and suggests a downward adjustment (e.g., "I obviously cook worse

than I thought I would.") As we will discuss in more detail in the following, research on the effects of discrepancy size on self-concept change has produced largely consistent findings: Larger discrepancies lead to more change. By contrast, research on the effects of discrepancy direction on self-concept change provides a stunningly inconsistent picture. Some studies have found larger self-concept change after positive than negative feedback, while others have observed exactly the opposite pattern. With the present research, we aim to contribute to this literature by (1) systematically examining the effect of positive and negative feedback on self-concept change under different conditions and by (2) testing a theoretical explanation for the inconsistent previous findings. In the process, we also provide further evidence on the effect of the size of discrepancy on self-concept change.

Discrepant Feedback and Self-Concept Change

Before reviewing the relevant literature on self-concept change, it is helpful to clarify which terms and conceptualizations have been used to describe (changes in) people's self-concept in different research areas and how we define these constructs here. Early research in the educational context uses the term self-concept to describe a person's self-perceptions regarding specific or more global self-relevant dimensions (Marsh & Shavelson, 1985; Shavelson et al., 1976). This term has been adopted by more recent research on changes in self-perceptions (Elder et al., 2022; Korn et al., 2012). The management literature often refers to (updating of) self-beliefs when examining how new self-relevant information impacts people's self-perceptions (Eil & Rao, 2011; Ertac, 2011; Möbius et al., 2022), while clinical research often speaks of (updating of) expectations (Kube et al., 2019, 2022). Our own definition of self-concept change builds upon the definition by Shavelson et al. (1976) and attempts to be even more precise: We argue that self-concept change has occurred whenever a person's perception of themselves on a specific self-relevant dimension at a given time point differs from a previous self-perception on the same dimension.

In addition, we should also clarify what we mean by feedback, given that this term is central for

the research presented here: Feedback means any kind of external information that a person receives on a self-relevant dimension (e.g., on a trait or an ability). Importantly, this feedback must be perceived as diagnostically relevant for this specific dimension: If Anna thinks she is a mediocre cook, and Peter says “what a great dish” while tasting the dinner she prepared, then Peter’s feedback is more diagnostically relevant for Anna’s self-concept (regarding her cooking skills) than if Peter had remarked that he had already eaten something similar the other day. While giving and decoding feedback can entail misunderstandings, the extent to which feedback is quantitatively discrepant from one’s self-concept on a specific dimension is often unambiguous, especially when both one’s self-concept and the feedback are quantifiable (e.g., for performance expectations and tests).

Studies investigating the effect of the size of the discrepancy between self-concept and feedback consistently demonstrate that larger discrepancies lead to more self-concept change (i.e., larger differences between previous and current self-perceptions) than smaller discrepancies, except for extreme and likely implausible discrepancies (Bergin, 1962; Binderman et al., 1972; Kube et al., 2022). Regarding the direction of the discrepancy, however, the empirical findings are less conclusive. Several studies show that positive and negative feedback lead to different amounts of self-concept change. Interestingly, it is unclear which of the two types of feedback leads to larger self-concept change: The majority of studies find larger self-concept change after positive than after negative feedback, indicating a positivity bias in the processing of self-relevant information (Eil & Rao, 2011; Elder et al., 2022; Korn et al., 2012; Möbius et al., 2022). The term *positivity bias* hereby is not meant to imply that such processing of self-relevant information is irrational; we merely use it to describe cases in which positive feedback produces more self-concept change than negative feedback. Notably, two recent studies demonstrate larger self-concept change after negative than after positive feedback (Ertac, 2011; Müller-Pinzler et al., 2019) —a pattern that rather suggests a negativity bias.

To investigate self-concept change, all studies mentioned above assessed participants’ self-

perceptions before and after presenting them with (discrepant) feedback. The two studies that have found a negativity bias produced the discrepant feedback as follows: Ertac (2011) presented participants with performance feedback on several rounds of math and verbal problems. Müller-Pinzler et al. (2019) asked participants to estimate properties of different objects over several rounds and presented them with fake feedback on their performance. Comparing these two studies to the ones that have found a positivity bias and identifying meaningful differences is difficult as the studies differ from each other in many aspects (e.g., different types of feedback were given regarding various aspects of the self-concept; Eil & Rao, 2011; Elder et al., 2022; Ertac, 2011; Müller-Pinzler et al., 2019). That said, it is worth mentioning that the two studies that found a negativity bias both (1) assessed self-concept change in the intellectual ability domain (i.e., estimation, verbal, and math abilities), (2) confronted participants with performance feedback over multiple rounds, and (3) measured self-concept in a situation-specific way as they assessed participants' performance expectations for each upcoming round. Yet, the question whether a negativity bias also occurs in other contexts has remained unresolved so far. In the present research, we investigate under which conditions positively or negatively biased self-concept change occurs. In particular, we are interested in whether a negativity bias also occurs (1) on other aspects of the self-concept rather than performance expectations, (2) when presenting participants with feedback only once, and (3) when examining more generalized rather than situation-specific self-perceptions. In doing so, we also examine the effect of the size of discrepancy on self-concept change. While we are mainly interested in the main effects of size and direction of discrepancy separately, we also explore whether they interact in producing self-concept change. Prior studies have largely neglected possible interaction effects of these variables. However, it is plausible, for example, that the direction of discrepancy is only relevant for large discrepancies and less impactful for small discrepancies.

A Psychological Explanation for Asymmetries in Self-Concept Change: Self-Enhancement and Self-Improvement

There are different theoretical approaches to explaining the positivity and negativity bias in self-concept change and the contradictory findings that have resulted from previous research. One such approach focuses on two processes that shape how people perceive and integrate feedback into the self-concept: self-enhancement and self-improvement. Both self-enhancement and self-improvement assume that people are motivated to maintain a positive view of themselves even (or particularly) in the face of disconfirming feedback (Taylor & Brown, 1988). While *self-enhancement* describes biases in processing and interpreting information in a self-serving fashion (Heine & Hamamura, 2007), *self-improvement* describes biases aimed at reducing discrepancies between an "is-state" and a desirable "ought-state" (Kurman, 2006).

When a person receiving feedback is motivated to self-enhance, they should focus on positive and dismiss negative information as the latter is perceived as threatening one's positive self-view. Therefore, a self-enhancement motive should lead to positively biased self-concept change. When a person receiving feedback is motivated to self-improve, however, negative feedback is more informative than positive feedback because the former highlights opportunities for improvement. In other words, such a person should be negatively biased in changing their self-concept. This is consistent with theoretical accounts on a general negativity bias in human perception, behavior, and decision-making. Such accounts argue that learning from negative stimuli is more adaptive than learning from positive stimuli (Norris, 2021; Vaish et al., 2008): Avoiding negative consequences in the future is often more vitally important than approaching positive consequences. A negativity bias in learning from self-relevant feedback might serve a similar purpose as focusing on negative feedback promotes learning from one's shortcomings and might therefore be advantageous in the long run.

While self-improvement is triggered in particular when a person perceives that they can

overcome is-ought discrepancies (e.g., by practicing or rehearsing), self-enhancement should be triggered when a person perceives it as impossible to improve on the self-concept aspect in question (Müller-Pinzler et al., 2019). When the aspect of the self-concept is perceived as fixed and unimprovable, negative feedback does not have an informational value towards improving oneself, but is, instead, particularly threatening to one's positive self-view (Dunning, 1995; Dweck et al., 1995; Levy & Dweck, 1998). In such cases, the only possibility of maintaining one's positive self-view is to self-enhance. Perceiving little opportunity for improvement should therefore trigger self-enhancement and produce positively biased self-concept change. Supporting this theorizing, a positivity bias—reflecting a self-enhancement process—has been empirically demonstrated on those self-concept aspects that are most likely to be perceived as fixed and unchangeable by most people (e.g., intelligence or beauty, see Eil & Rao, 2011; Möbius et al., 2022) or if the study was designed such that participants likely saw little opportunity for improvement (e.g., one-shot feedback from third parties; see Elder et al., 2022; Korn et al., 2012). These findings are also consistent with other studies on belief updating after feedback (Lefebvre et al., 2017).

By contrast, when the self-concept aspect in question is perceived as improvable ("malleable"), negative feedback is more informative for self-improvement purposes than positive feedback (Strube, 2012). Perceiving a high opportunity for improvement should trigger self-improvement motives and, thus, make a negativity bias (regarding the effect of feedback on self-concept change) more likely. This may explain the effects that Ertac (2011) and Müller-Pinzler et al. (2019) reported: Participants in these studies may have perceived the respective aspects of their self-concept (i.e., estimation, verbal, and math skills) as improvable and may have seen an opportunity to improve on the respective ability due to the repeated feedback over multiple rounds, which rendered negative feedback more informative than positive feedback.

Besides this explanation that focuses on how two motivational processes might shape feedback

integration, there are other explanations for the contradictory findings on asymmetric self-concept change. One such explanation might be the diagnosticity of positive and negative self-relevant information (i.e., the informational value of positive and negative feedback for one's self-knowledge). If positive information is perceived as more diagnostic than negative information under certain conditions, this might lead to positively biased self-concept change, while, under other conditions, negative information might be perceived as more diagnostic, causing negatively biased self-concept change. Research on person perception has demonstrated that positive compared to negative information on another person is perceived as more or less diagnostic under different conditions (Unkelbach et al., 2020). If this were the case for self-relevant information as well, it might explain the contradictory findings on self-concept change.

To sum up, the opportunity for improvement in conjunction with motives for self-enhancement and self-improvement may be a plausible explanation for the contradictory findings on self-concept change after negative vs. positive feedback. Yet, this explanation has not been systematically examined so far. Therefore, the present research investigates the role of the opportunity for improvement in asymmetric self-concept change.

The Present Studies

The present research aims to contribute to the literature on self-concept change after self-relevant feedback by (1) investigating under which conditions a positivity or negativity bias occurs as well as by (2) testing whether the opportunity for improvement causes positively or negatively biased self-concept change. More specifically, a low perceived opportunity for improvement should lead to positively biased self-concept change, while a high perceived opportunity for improvement should lead to negatively biased self-concept change—if self-enhancement and self-improvement play a role here.

In four studies, we investigated the effect of the size of discrepancy (SoD) and direction of discrepancy (DoD) on the intention for and on actual self-concept change. Study 1 investigated

intentions for self-concept change after self-relevant feedback using an autobiographic recall design. In Study 2, we examined actual self-concept change after participants had received (manipulated) self-discrepant feedback on a specific aspect of their self-concept. Study 3 was designed to replicate and extend Study 2 by examining a different aspect of participants' self-concepts in a more ecologically valid fashion. Finally, in Study 4, we investigated whether the perceived opportunity to improve is decisive in whether negative or positive self-relevant feedback are associated with a larger self-concept change.

All details regarding manipulations, measures, and exclusions for all four studies as well as the data and the R code necessary to replicate all primary analyses are available online at https://osf.io/yadqw/.

Study 1

Study 1 investigated the relationship between SoD and DoD and the intention for self-concept change in an exploratory manner. Using an autobiographical recall design, we asked participants to remember the last time they had received self-relevant feedback and assessed characteristics of and participants' reactions to the feedback. This enabled us to examine feedback across a variety of contexts, formats, and aspects of the self-concept.[3]

Method

Sample

Participants were recruited through university and other mailing lists in exchange for raffled vouchers (two vouchers worth 50 Euros). As for all following studies, the only eligibility criterion was an age of at least 18 years. The study was online for 4 weeks and our sampling strategy was to collect as many data as possible during this period. A total of 360 individuals completed the survey, of which *n*=12

[3] Due to the exploratory nature of this study, we did not preregister it.

were excluded because, when asked, they indicated that their data should not be used. The final sample thus comprised *N*=348 participants (M_{age}=38.70 years, SD_{age}=16.67 years; 250 female, 94 male, four "other"). For our main analyses, we did not consider participants who indicated that their feedback was neither positive nor negative (see below) as they were not relevant to our research question. This left us with a sample of *n*=239 participants for these analyses. With this sample size, we could detect an effect of sr^2=.04 for the two predictor variables of interest (i.e., SoD and DoD) according to a sensitivity analysis conducted in G*Power (α=.05, 1-β=.80, total sample size=239, number of tested predictors=2; Faul et al., 2007).

Measures

Participants responded to several measures, presented in the following order equivalent for all participants.

SoD. We measured the SoD of the discrepancy with one item ("Please remember how you evaluated yourself on the trait, ability, etc. prior to receiving the feedback. How much did the feedback deviate from your self-evaluation?"). Participants indicated their response on a scale from 1=*not at all* to 7=*very much* (*M*=3.05, *SD*=1.66).

DoD. We measured the direction of the discrepancy with one item ("Was the feedback more positive or negative than you would have rated yourself?"). Participants indicated whether the feedback was *more positive*, *more negative*, or *neither more positive nor more negative* by selecting one of these three response options (options chosen with frequency of 50%, 19%, and 31%, respectively).

Intentions for Self-Concept Change. We measured participants' intentions for self-concept change using three items based on a scale previously used by Henss & Pinquart (2022) to assess coping with violated expectations, "Based on the feedback, I have reconsidered or will reconsider my self-evaluation regarding the trait, ability, etc.", "The feedback has made me question whether my self-evaluation is correct", "The feedback had no impact on my self-evaluation" (reverse-coded); α=.74. The

items were rated on a scale from 1=*strongly disagree* to 6=*strongly agree* (*M*=3.12, *SD*=1.34).[4]

Results

As for all the following studies, we used *R* to conduct our analyses (R Core Team, 2018). To test whether SoD and/or DoD (as well as the interaction between the two) were significantly related to intentions for self-concept change, we conducted a regression analysis with the size and direction of the discrepancy as well as their interaction as predictors of mean intentions for self-concept change. The DoD was effect-coded (i.e., "negative"=-1, "positive"=1) and size was standardized to facilitate the interpretation of the regression coefficients. Overall, the model explained a significant amount of variance in intentions for self-concept change, $F(3, 235)=24.59$, $p<.001$, $R^2=.24$, 95% CI [.14, .32]. SoD was significantly related to intentions for self-concept change, $B=0.22$, $t(235)=2.63$, $p=.009$, 95% CI for B [0.06, 0.39], $sr^2=.02$, indicating that, across negative and positive discrepancies, larger discrepancies were associated with larger intentions for self-concept change. In addition, DoD was significantly related to intentions for self-concept change, $B=-0.47$, $t(235)=-5.19$, $p<.001$, 95% CI for B [-0.64, -0.29], $sr^2=.09$, indicating that negative discrepancies were associated with larger intentions for self-concept change than positive discrepancies. Furthermore, a significant interaction emerged, $B=0.37$, $t(235)=4.37$, $p<.001$, 95% CI for B [0.20, 0.54], $sr^2=.06$. Subsequent simple slopes analyses using the reghelper package (Hughes & Beiner, 2021) revealed that for positive discrepancies, SoD was positively related to self-concept change intentions, $B=0.60$, $t(235)=6.37$, $p<.001$, whereas no such relation emerged for negative discrepancies, $B=-0.15$, $t(235)=-1.04$, $p=.298$.[5]

---

[4] In addition to the measures described in detail, participants also completed some other measures. A complete list of all measured variables for this and all following studies can be accessed at https://osf.io/yadqw/. As the additional measures are not central to the present research, they will not be further discussed.

[5] We conducted additional analyses exploring gender differences for this and all following studies. The results of these analyses can be found at https://osf.io/yadqw/ (Appendix A for Study 1, B3 for Study 2, C2 for Study 3, and D3 for Study 4).

Discussion

While our findings are in line with previous studies demonstrating a positive relationship between the SoD and self-concept change (Bergin, 1962; Binderman et al., 1972), we also find larger intentions for self-concept change after negatively than after positively discrepant feedback. This is especially noteworthy as we did not use a design in which participants were asked to repeatedly update performance expectations after receiving performance feedback. Instead, we asked participants about the most recent self-relevant feedback they had received without limitations regarding the content, context, or format of the feedback. Our findings thus provide the first evidence that a negativity bias might not be limited to the specific circumstances investigated by Ertac (2011) and Müller-Pinzler et al. (2019).

Even though Study 1 provides first evidence for a negativity bias in self-concept change after feedback, there are three limitations that need to be mentioned and discussed. First, we asked participants to recall the most recent feedback they had received, regardless of whether it was positive or negative. Different processing of positive and negative information or other recall errors might have biased our results. Second, we assessed intentions for self-concept change instead of actual self-concept change as the dependent variable. This was done as we wanted to examine a broad range of self-concept aspects and it would not have been possible to assess participants' actual self-concepts on all possible aspects. However, we cannot be certain that intentions for self-concept change reflect patterns of actual self-concept change. Third, participants might have received their most recent feedback in a context similar to the ones in which a negativity bias was previously found. This seems unlikely, as it would mean that the majority of participants had most recently received repeated feedback on a performance task. However, we cannot be fully certain that this was not the case. Study 2 was designed to address these limitations.

Study 2

Study 1 provided evidence for a negativity bias in intentions for self-concept change. In Study 2, we aimed at examining actual self-concept change by presenting participants with feedback on a specific aspect of their self-concept and assessing subsequent self-concept change. To do so, we manipulated the SoD and DoD. Furthermore, we experimentally varied whether participants received feedback once or multiple times, resulting in a 2x2x2 design. The study was designed to investigate the effects of SoD and DoD on self-concept change under controlled conditions. Furthermore, we wanted to examine biases in self-concept change depending on whether participants receive feedback repeatedly compared to just once.

A preregistration detailing the study design, pre-planned stopping rule, and exclusion criteria is available at https://aspredicted.org/te8gc.pdf.[6]

Method

Sample

Participants were recruited through university and other mailing lists, social media, and flyers distributed on campus of a German university and could participate in a raffle for vouchers or receive course credit in return for their participation. Data were collected until the date specified in our preregistered stopping rule. In total, 627 participants completed the study. As preregistered, we excluded participants based on several exclusion criteria to ensure a high data quality.[7] After following

---

[6] We deviated from the preregistered analyses for H1 to be consistent with the analyses used for the other studies in this paper. The preregistered analysis, however, produces the same pattern and significance of results as the analysis used in the present research. We did not test the preregistered H2-H4 because they were part of another project examining the role of self-concept clarity in self-concept change, which is not relevant to the present research.

[7] To do so, we assessed several attention check items as well as a *use me*-item in this and all following studies.

the preregistered exclusion criteria, the final sample included data from N=373 participants (M_{age}=29.33 years, SD_{age}=12.50 years; 290 female, 77 male, five "other," one did not respond).[8] We conducted a sensitivity analysis using G*Power (α=.05, 1-β=.80, total sample size=373, number of tested predictors=3; Faul et al., 2007) and discovered that we were able to detect an effect of sr^2=.03 of any of the three predictors of interest in our main analysis (i.e., SoD and DoD, interaction DoD x frequency of feedback).

Procedure

Participants learned that the study would be about their spatio-visual ability, received an explanation of what this ability encompassed, and were told that it was normally distributed across the population. They were then asked to rate their ability (see below) and were immediately shown their self-perception score, which was created by converting participants' mean self-perception into a percentage. An exemplary feedback read: "On a scale of 0% (very low ability) to 100% (very high ability) your self-rated ability for spatio-visual thinking is at: 50%." At this point, participants were randomly assigned to two frequency of feedback conditions (once, three times). Depending on their condition, participants were asked to work on either one or three subsequent tasks measuring spatio-visual thinking. In these tasks, which were adapted from the Wiener Matrizen-Test 2 (WMT-2; Formann et al., 2011) and two subtests of the Wilde Intelligenztest-2 (WIT-2; Kersting et al., 2008), participants were asked to mentally manipulate objects to find solutions to given questions (e.g., participants had to mentally fold sides of a cube). Each task contained 18 to 20 subtasks, and participants were asked to

[8] Most of the n=254 participants were excluded due to the following two criteria: First, to ensure that participants could be randomly assigned to the experimental feedback conditions, participants with too low or high initial self-perceptions had to be excluded (n=126). Second, a further n=112 participants were excluded because they did not pass both of our two attention checks. Conducting the main analysis without excluding participants who failed the attention checks does not change the pattern or significance of our results.

complete as many of them as they could within the given timeframe (2 minutes per task). Participants who worked on only one task were randomly assigned one of the three tasks. After completing a task, participants received (false) feedback about their performance in the test (i.e., their percentage of correctly solved subtasks; they received feedback either once or three times, see above). Specifically, participants were randomly assigned to one of two SoD conditions (small, large) and one of two DoD conditions (negative, positive). In case of a small SoD, participants received feedback that deviated from their self-perception score by around 5%; a large size of discrepancy referred to a deviation of around 20%.[9] For those assigned to the negative (positive) DoD condition, this number was subtracted from (added to) their self-perception score. An exemplary feedback read: "You correctly solved 70% of the task. As a reminder: Your self-perception was 50%." Afterward, participants were once again asked for their self-perception regarding their ability for spatio-visual thinking. At the end of the study, participants were debriefed and had the opportunity to learn their actual task score(s).

Measures

Self-Concept Change. Participants' self-perceptions were measured at two occasions with the same five items on a 9-point scale from 1=*strongly disagree* to 9=*strongly agree* (e.g., "I have no difficulty at all in imagining shapes and objects in my mind's eye"; α_{t1}=.82, M_{t1}=5.65, SD_{t1}=1.29; α_{t2}=.90, M_{t2}=5.34, SD_{t2}=1.65). To create the self-concept change score, we subtracted self-perceptions at t1 from self-perceptions at t2. As we were interested in the absolute amount of change, we created absolute values of this score, resulting in the final absolute self-concept change score used in all analyses (*M*=0.76, *SD*=0.71).

[9] To avoid the impression that feedback was systematically manipulated, small discrepancies deviated by either 4%, 5%, or 6% from participants' self-perception scores, while large discrepancies deviated by 19%, 20%, or 21%.

Perceived SoD. We assessed participants' perceived SoD with one item ("How large was the difference between your self-perception and your percentage of correctly solved tasks on spatio-visual reasoning?") on a scale from 1=*small* to 9=*large*. This item was used as a manipulation check for SoD (*M*=4.04, *SD*=2.17).

Perceived DoD. We measured whether participants had correctly perceived the DoD with one item ("On average, was your score in the tasks better or worse than your previously submitted self-perception? [Did you end up solving fewer or more tasks correctly?]"). Participants indicated whether they had performed *better* or *worse* in the tasks than they had indicated in their self-perception (options chosen with a frequency of 51% and 49%, respectively).

Perceived Frequency of Feedback. We assessed whether participants had correctly perceived the number of times they had received task feedback throughout the study with one item ("How many times did you in total receive feedback related to your performance in the spatial-visual reasoning tasks?"). Participants indicated whether they had received task feedback *once*, *three times*, or *not at all* (options chosen with a frequency of 46%, 49%, and 5%, respectively).[10]

Results

First, we tested whether our experimental manipulations were successful. A Welch two-sample *t*-test showed that participants in the large discrepancy condition perceived larger discrepancies (*M*=5.41, *SD*=1.81) than those in the small discrepancy condition (*M*=2.53, *SD*=1.40), *t*(345.94)=-16.91,

[10] Among the additionally measured constructs, which can be accessed at https://osf.io/yadqw/, was a measure for participants reactions to the feedback using a 13-item scale based on Henss & Pinquart's (2022) scale for coping with expectation violations. This scale included four items measuring participants' intentions for self-concept change. As this and all following studies focus on actual self-concept change as the dependent variable, we do not report the results for intentions to change here. Instead, they can be found https://osf.io/yadqw/ for this and all following studies (Appendix B4 for Study 2, C3 for Study 3, and D4 for Study 4). When conducting the main analyses using intentions for self-concept change as the dependent variable, patterns and significances of results in this and all following studies are largely identical to the results for actual self-concept change.

p<.001, Cohen's *d*=-1.77, 95% CI [-2.02, -1.53] (effsize package; Torchiano, 2020). Furthermore, for both the negative and the positive DoD condition, 98% of participants correctly indicated their respective condition on our one-item measure. For the frequency of feedback conditions, 89% of participants who had received feedback once and 94% of participants who had received feedback three times correctly indicated so in response to the respective item.

For our main analysis, we conducted a regression analysis with SoD, DoD, frequency, and all possible interaction terms as predictors of absolute self-concept change (i.e., the absolute difference between self-perceptions at t2 and t1; see Method section for further information). All predictors were effect-coded (i.e., for SoD, "small"=-1 and "large"=1; for DoD, "negative"=-1 and "positive"=1; for frequency of feedback, "once"=-1 and "three times"=1). The results are summarized in Table 1. Two effects turned out to be statistically significant: First, larger discrepancies led to more self-concept change than smaller discrepancies, *B*=0.18, *p*<.001. Second, negative discrepancies led to more self-concept change than positive discrepancies, *B*=-0.15, *p*<.001. No other effects were significant.

Table 5.1
Regression Analysis Summary for Size and Direction of Discrepancy as well as Frequency of Feedback Predicting Absolute Self-Concept Change in Study 2.

Predictor	*B*	*SE B*	*t*	*p*	95% CI for *B* [LL, UL]	sr^2
Size of Discrepancy (SoD)	0.18	0.03	5.15	<.001	[0.11, 0.25]	.06
Direction of Discrepancy (DoD)	-0.15	0.03	-4.43	<.001	[-0.22, -0.09]	.05
Frequency of Feedback (FoF)	0.05	0.03	1.46	.144	[-0.02, 0.12]	.01
SoD x DoD	-0.03	0.03	-0.78	.435	[-0.10, 0.04]	.00
SoD x FoF	0.04	0.03	1.15	.251	[-0.03, 0.11]	.00
DoD x FoF	-0.03	0.03	-0.93	.356	[-0.10, 0.04]	.00
SoD x DoD x FoF	0.01	0.03	0.34	.734	[-0.06, 0.08]	.00

Note. R^2=.12 (*N*=373, *p*<.001). SoD: small=-1, large=1. DoD: negative=-1, positive=1. FoF: once=-1, three times=1. *B* represents unstandardized regression weights. LL and UL indicate the lower and upper limits of a confidence interval, respectively. sr^2 represents the squared semipartial correlation.

Discussion

Our findings in Study 2 are consistent with our findings from Study 1 in that large SoDs lead to more self-concept change than small ones. In addition, we show that negative discrepancies are associated with more self-concept change than positive discrepancies regardless of the frequency of feedback, providing evidence that a negativity bias in self-concept change does not merely occur in contexts of repeated performance feedback. However, Study 2 only investigates one specific aspect of the self-concept. Therefore, we expand our research to another aspect of the self-concept in Study 3.

Study 3

In Study 3, we expand our findings from Study 2 by examining self-concept change after self-relevant feedback regarding a different aspect of the self-concept. To increase ecological validity, we presented participants with their actual instead of artificially created feedback, reflecting feedback in naturally occurring situations. The study was designed to further test the effects of SoD and DoD on self-concept change.

A preregistration for the study design, pre-planned stopping rule, and exclusion criteria can be found at https://aspredicted.org/4hr79.pdf.[11]

Method

Sample

The recruiting channels, sampling strategy, and participation rewards for Study 3 were equivalent to those of Study 2. Data were collected until the date preregistered in our stopping rule. When data collection was stopped, 463 individuals had participated in the complete study. As per our

[11] We deviate from the preregistered analyses as they were part of a research project examining the role of reflection in self-concept change and are not applicable to the research questions investigated in the present research.

preregistered exclusion criteria, we excluded *n*=87 participants, resulting in a final sample of *N*=376 participants (M_{age}=35.29 years, SD_{age}=14.42 years; 271 female, 100 male, five "other"). Beyond the preregistered exclusions, equivalent to Study 1, we did not consider participants with neither positive nor negative discrepancies in our main analyses, resulting in the further exclusion of *n*=3 participants and a sample of *n*=373 for these analyses. A sensitivity analysis conducted with G*Power (α=.05, 1-β=.80, total sample size=373, number of tested predictors=2; Faul et al., 2007) suggested that an effect of sr^2=.03 can be detected with this sample size.

Procedure

Participants were told that this study would be about their emotion-recognition skills—the ability to correctly identify an emotion experienced by a target person based on this person's eye area. The study procedure was similar to that of Study 2 in that participants first indicated their self-perceived emotion-recognition skills, which were then feedbacked to them in a percentage format. Afterwards, participants completed a short version of the Reading the Mind in the Eyes Test (Bölte, 2005). In this test, participants were repeatedly presented with photographs of human eye areas and tasked with choosing the correct out of four possible emotions felt by the person in the photograph. After completing the task, participants received feedback on their task score, the percentage of correctly chosen emotions in the task.[12] Contrary to Study 2, the feedbacks reflected participants' actual task scores.[13] Afterwards, participants were once again asked about their self-perceived emotion-recognition

[12] Feedbacks for Study 3 were equivalent to those in Study 2 in content and very similar in wording. An exemplary feedback for Study 3 can be found in the study materials at https://osf.io/yadqw/.

[13] As this study was originally geared towards examining a different research question, the following manipulation was included at this point in the study: Participants were randomly assigned to one of two conditions, in which they were either asked to reflect on the feedback they had received or to work on a distractor task aimed at inducing cognitive load and inhibiting reflection. This manipulation is not central to the present research and is therefore not further discussed. Entering the reflection conditions into our main analyses does not change the pattern or significance of our results.

skills. At the end of the study, participants had the opportunity to complete and receive feedback on the full Reading the Mind in the Eyes Test (Bölte, 2005).

Measures

Self-Concept Change. Participants' self-perceptions were measured at two occasions with the same four items on a 9-point scale from 1=*strongly disagree* to 9=*strongly agree* (e.g., "It's very easy for me to read a person's emotions from their eyes"; α_{t1}=.91, M_{t1}=4.94, SD_{t1}=1.62; α_{t2}=.94, M_{t2}=4.80, SD_{t2}=1.61). Absolute self-concept change scores were calculated following the same approach as in Study 2 (M=0.89, SD=0.94).

Perceived SoD. The perceived SoD between self-perceptions and feedback was measured with one item ("How large did you perceive the difference between the feedback on your self-perception and the photo task to be?") on a 9-point rating scale from 1=*very small* to 9=*very large* (M=5.17, SD=2.30).

Results

In preparation for our analyses, we created scores for SoD and DoD. Since their percentage scores for self-perceived ability and their actual scores in the emotion-recognition task were scaled identically, we subtracted participants' self-perception percentage scores at t1 from their task scores. The absolute values of this variable served as the SoD. The variable was also used to create the DoD variable: Negative scores were coded as *negative* and positive scores as *positive* DoDs. Cases with no discrepancy between task sore and self-perception at t1 were coded as *neither positive nor negative* discrepancies.

First, we checked whether participants' perceptions of the SoD were consistent with the actual SoD between self-perceptions and feedback. The correlation between the perceived and the actual SoD was $r(374)=.73$, $p<.001$.

For our main analysis, we fitted a linear regression model with SoD and DoD as well as the interaction between the two as predictors of absolute self-concept change. Again, DoD was effect-coded

(i.e., “negative”=-1, “positive”=1). SoD was standardized on the sample mean and standard deviation. Overall, the model explained a significant amount of variance in self-concept change, $F(3, 369)=6.90$, $p<.001$, $R^2=.05$, 95% CI [.01, .10]. SoD was positively related to self-concept change, $B=0.27$, $t(369)=3.86$, $p<.001$, 95% CI for B [0.13, 0.41], $sr^2=.04$. Moreover, DoD was significantly related to self-concept change, $B=-0.16$, $t(369)=-2.65$, $p=.009$, 95% CI for B [-0.28, -0.04], $sr^2=.02$, such that negative discrepancies were associated with larger self-concept change than positive discrepancies. The SoD x DoD interaction effect was not significant, $B=-0.08$, $t(369)=-1.17$, $p=.245$, 95% CI for B [-0.22, 0.06], $sr^2=.00$.

Discussion

Just as in the two previous studies, we find that (a) larger SoDs and (b) negative discrepancies are associated with more self-concept change. The latter finding lends further support to the notion of a negativity bias in self-concept change. Study 4 was designed to explore a potential mechanism underlying asymmetric self-concept change.

Study 4

Study 4 aimed to explore whether the perceived opportunity for improvement is the psychological mechanism underlying the negativity bias we have observed so far. To do so, we aimed to manipulate participants’ subjective expectation that they can (vs. cannot) improve on the ability in question (in other words, whether they see an opportunity to improve or not). More specifically, half of the participants were led to believe that it is possible to improve on the ability in question (i.e., emotion-recognition skills), while the other half learned that emotion-recognition skills cannot be improved via rehearsal etc. With this manipulation and the result pattern it produces, we aimed at indirectly inferring whether self-enhancement and self-improvement play a role here: If the negativity bias was indeed due to self-improvement processes, then such a bias should occur in the high, but not in the low opportunity for improvement condition. In the latter condition, negative feedback should be uninformative and even

threatening for the self. Here, self-enhancement processes should lead to a positivity bias. We therefore hypothesized and preregistered an interaction effect of DoD x opportunity for improvement on self-concept change. Furthermore, we hypothesized and preregistered a main effect of SoD on self-concept change.

A preregistration detailing the study design, pre-planned stopping rule, exclusion criteria, and planned analyses is available at https://aspredicted.org/rr4r7.pdf.

Method

Sample

Participants were recruited through university and other mailing lists in return for raffled vouchers. Data collection was stopped according to the preregistered stopping rule, with 548 individuals having completed the survey. Applying the preregistered exclusion criteria, we excluded *n*=89 participants. The final sample thus comprised *N*=459 participants (M_{age}=32.55 years, SD_{age}=14.02 years; 332 female, 119 male, eight "other"). As preregistered, we did not consider participants whose feedback was neither positive nor negative for all analyses that included the DoD. This led to the exclusion of *n*=6 participants and left us with a sample of *n*=453 participants for these analyses. With this sample size, we could detect an effect of sr^2=.02 for the two hypothesized effects (i.e., SoD and interaction DoD x opportunity for improvement) according to a sensitivity analysis conducted in G*Power (α=.05, 1-β=.80, total sample size=453, number of tested predictors=2; Faul et al., 2007).

Procedure

The design of Study 4 was very similar to Study 3, with one important main difference:[14] Immediately after giving participants feedback about their task performance (i.e., their percentage score

[14] The manipulation of inducing or hindering reflection from Study 3 was omitted in Study 4.

from the short Reading the Mind in the Eyes Test adapted from Bölte, 2005; see Study 3), they were randomly assigned to one of two experimental conditions (opportunity for improvement: low, high). In the *high opportunity for improvement* condition, participants read the following information:

> "You have just received feedback on your ability to recognize emotions from people's eyes. Research in this area shows: People can change their ability to do this. People who train the ability perform better on subsequent tests of the ability than they did before."

In the *low opportunity for improvement* condition, they read the following information:

> "You have just received feedback on your ability to recognize emotions from people's eyes. Research in this area shows: People can hardly change their ability to do this. People who train the ability do not perform better on subsequent tests of the ability than they did before."

Study 4 further differed from Study 3 in that we conducted a manipulation check regarding the opportunity for improvement manipulation after measuring participants' self-perceptions at t2.[15] Afterward, like in Study 3, participants were debriefed and could complete and receive feedback on the full Reading the Mind in the Eyes Test (Bölte, 2005).

Measures

Self-Concept Change. Participants' self-perceptions were measured at two occasions using the same items as in Study 3 (α_{t1}=.94, M_{t1}=5.10, SD_{t1}=1.72; α_{t2}=.94, M_{t2}=4.84, SD_{t2}=1.58). Self-concept change scores were computed in the same fashion as in Study 3 (M=0.89, SD=0.93).

---

[15] We employed one additional measure assessing upward or downward comparison at this point in the study: Participants were given the opportunity to compare themselves to one of two other alleged participants, one of whom had performed worse and one of whom had performed better than the participant. This measure served as an additional exploratory measure of motives for self-enhancement and self-improvement, as previous research has shown that upward comparisons are found when motives for self-improvement are present, while downward comparisons are used to self-enhance (Buunk & Gibbons, 2007). The full description of this measure as well as the exploratory analyses conducted with it can be accessed at https://osf.io/yadqw/ (see Appendices D5 and D6 for the analyses).

Perceived SoD. The perceived SoD was assessed using the same item as in Study 3 (*M*=5.33, *SD*=2.32).

Perceived Opportunity for Improvement. To check whether our opportunity for improvement manipulation was successful, we assessed the perceived opportunity for improvement with eight items adapted from De Castella and Byrne's (2015) revised scale for measuring implicit theories of intelligence (e.g., "I believe that I can significantly improve my ability to recognize emotions based on the eye area"; α=.94). Participants indicated their agreement on a scale from 1=*strongly disagree* to 9=*strongly agree* (*M*=5.18, *SD*=1.76).

Results

Mirroring our approach from Study 3, we created scores for SoD and DoD. Like in Study 3, we first checked whether participants' perceptions of the SoD were consistent with the actual SoD between self-perceptions and feedback. The correlation between the perceived and the actual SoD was $r(457)=.75$, $p<.001$. Then, we checked whether our opportunity for improvement manipulation was successful by conducting a Welch two-sample *t*-test. The *t*-test revealed that the perceived opportunity for improvement was significantly higher in the high (*M*=5.94, *SD*=1.52) than in the low opportunity for improvement condition (*M*=4.45, *SD*=1.67), $t(455.7)=10.01$, $p<.001$, Cohen's $d=0.93$, 95% CI [0.74, 1.13] (effsize package; Torchiano, 2020).

To test our hypotheses, as preregistered, we conducted a regression analysis with SoD (absolute values; standardized on sample mean and standard deviation), DoD (negative=-1 and positive=1), and opportunity for improvement (low=-1, high=1) as well as all interaction terms as predictors of absolute self-concept change. Results are displayed in Table 2. As expected, SoD was significantly related to self-concept change, $B=0.38$, $p<.001$. Furthermore, we found a significant main effect of DoD, $B=-0.38$, $p<.001$. Unexpectedly, the interaction effect between DoD and opportunity for improvement was not significant, $B=-0.04$, $p=.449$.

The SoD x DoD interaction effect was significant, B=-0.31, p<.001. We conducted simple slopes analyses for a model including SoD and DoD as well as their interaction as predictors of self-concept change using the reghelper package (Hughes & Beiner, 2021) to further examine this interaction effect. For negative discrepancies, the relationship between SoD and self-concept change was significant, B=0.68, t(449)=7.49, p<.001. This was not the case for positive discrepancies, B=0.08, t(449)=1.67, p=.095.

Table 5.2
Regression Analysis Summary for Size and Direction of Discrepancy as well as Opportunity for Improvement Predicting Absolute Self-Concept Change in Study 4

Predictor	*B*	*SE B*	*t*	*p*	95% CI for *B* [LL, UL]	sr^2
Size of Discrepancy (SoD)	0.38	0.05	7.12	<.001	[0.28, 0.49]	.09
Direction of Discrepancy (DoD)	-0.38	0.05	-8.07	<.001	[-0.47, -0.28]	.12
Opportunity for Improvement (OfI)	0.03	0.05	0.65	.517	[-0.06, 0.12]	.00
SoD x DoD	-0.31	0.05	-5.68	<.001	[-0.41, -0.20]	.06
SoD x OfI	-0.00	0.05	-0.04	.972	[-0.11, 0.10]	.00
DoD x OfI	-0.04	0.05	-0.76	.449	[-0.13, 0.06]	.00
SoD x DoD x OfI	0.02	0.05	0.30	.762	[-0.09, 0.12]	.00

Note. R^2=.17 (N=453, p<.001). SoD values are scaled. DoD: negative=-1, positive=1. OfI: low=-1, high=1. *B* represents unstandardized regression weights. LL and UL indicate the lower and upper limits of a confidence interval, respectively. sr^2 represents the squared semipartial correlation.

Discussion

In Study 4, we replicate our findings from Study 3, showing larger self-concept changes for larger discrepancies and after negative compared to positive feedback. Moreover, we find no evidence that the opportunity for improvement leads to biases in self-concept change.

General Discussion

In the present research, we examined the effects of SoD and DoD on self-concept change and explored an explanation for asymmetric self-concept change after positive and negative feedback. We found that larger discrepancies led to more self-concept change than smaller discrepancies, which is in

line with previous findings (Bergin, 1962; Binderman et al., 1972). Regarding the DoD, we found that negative feedback had a stronger impact on (intended or actual) self-concept change compared to positive feedback. This finding was consistent across different aspects of the self-concept (a variety of self-concept aspects in Study 1, spatio-visual thinking in Study 2, and emotion recognition abilities in Studies 3 and 4) and across paradigms (autobiographical recall in Study 1, manipulated task feedback of different frequencies in Study 2, and feedback reflecting naturally occurring task performance in Studies 3 and 4). As findings on the interaction effect between SoD and DoD were inconsistent, we do not interpret them here.

In addition, we aimed at testing whether two motives—self-enhancement and self-improvement—can explain our pattern of results by manipulating the opportunity for improvement regarding the trait in question in Study 4. The rationale behind this was that, if self-improvement and/or self-enhancement motives actually played a role, then a negativity bias should be more likely to occur in the "high opportunity for improvement" condition, whereas a positivity bias should be more likely to occur in the "low opportunity for improvement" condition. However, our results do not support this explanation as we find a negativity bias regardless of a low or high opportunity for improvement in Study 4.

Our manipulation check indicates that the manipulation successfully impacted the perceived opportunity for improvement as participants actually perceived a higher opportunity for improvement in the high than in the low opportunity for improvement condition. Notably, the experimental manipulation aimed at *indirectly* shaping participants' self-improvement or self-enhancement motives (i.e., self-improvement should only play a role in the high opportunity for improvement, self-enhancement in the low opportunity for improvement condition). That said, it is important to note that we did not *directly* manipulate self-enhancement and self-improvement motives in our study. Therefore, while our research does not suggest that these motives can explain contradictory findings on positively

and negatively biased self-concept change, the specific role that they play here remains to be scrutinized more directly by future research.

Theoretical Implications

Our findings provide several contributions to the existing research on self-concept change after discrepant feedback. First, our findings challenge the assumption of a robust positivity bias in self-concept change. Previous studies by Ertac (2011) and Müller-Pinzler et al. (2019) have already demonstrated a negativity bias specifically for updates in (intellectual) performance expectations over multiple feedback rounds. The present research contributes to this literature by showing that a negativity bias occurs (1) for self-concept aspects outside the intellectual domain, (2) even after single instances of feedback, and (3) regarding generalized instead of situation-specific self-perceptions. The latter finding is consistent with theoretical accounts on the hierarchical structure of the self-concept as feedback regarding a specific task should not only impact one's situation-specific self-concept but also be indicative of more general aspects of the self-concept (Shavelson et al., 1976). In sum, the present research broadens the current knowledge on the conditions under which a negativity bias in self-concept change can emerge.

Second, the present research questions whether self-enhancement and self-improvement motives can explain when a positivity or negativity bias emerges in self-concept change. According to theorizing by Müller-Pinzler et al. (2019), these motives should be triggered by a high or low opportunity for improvement, respectively, and cause negatively or positively biased self-concept change. However, our results do not support the assumption that the opportunity for improvement is decisive in whether a positivity or negativity bias emerges. We find that negative information is overweighed compared to positive information regardless of a low or high opportunity for improvement (Study 4). As we did not directly manipulate motives for self-enhancement and self-improvement, we cannot make strong claims about the role that these motives play in biased self-concept change. Nonetheless, if the motives did

play a role, we should have observed an interaction effect between the DoD and the opportunity for improvement manipulation. We found no such effect despite our study being sufficiently powered.

Besides motives for self-enhancement and self-improvement, a myriad of other motivational processes might be involved—although we have focused on the most prominently discussed motives and know of no other equally plausible candidates. Moreover, other factors such as the diagnosticity of positive and negative self-relevant feedback might be relevant in producing negatively or positively biased self-concept change. Research has shown that negative information is generally more impactful than positive information in person perception and in forming impressions of others (Unkelbach et al., 2020). One explanation for this effect is based on the differing properties of positive and negative information in our environment. More specifically, negative information is less frequent but more diverse, extreme, intense, and surprising than positive information (Leising et al., 2012; Unkelbach et al., 2020). This might lead to negative information being overweighed when forming and updating impressions of other people. Transferring these findings to the domain of self-concept change, it is possible that negative information is perceived as more diagnostic in learning about oneself than positive information. While negative feedback does not necessarily contain information on how to improve, it conveys that there is room for or even the necessity to improve. Coupled with negative information being rarer and more unexpected, this might increase attention to and elaboration on negative feedback and induce a negativity bias. Still, the question arises as to why several other studies have found a positivity bias. In the literature on person perception, it has been shown that under specific conditions, positive information can be more diagnostic than negative information (e.g., for specific domains of traits; Unkelbach et al., 2020). It remains an avenue for future research to investigate the diagnosticity of self-relevant information and the conditions under which positive versus negative self-relevant information is more diagnostic.

Limitations and Future Research

The present research is subject to several limitations and raises issues to be addressed in future studies. One limitation is that some features of our research might limit the generalizability of our findings. While we broadly assessed real life feedback across a variety of contexts, formats, and aspects of the self-concept in Study 1, we examined intentions for instead of actual self-concept change for feasibility reasons. Aiming for a highly ecologically valid but standardized examination of actual self-concept change in Studies 3 and 4, we presented participants with real task feedback. The paradigm used in these studies is similar to how certain types of feedback for online-self-assessments or in an educational or work context are produced. However, it does not reflect the full range of feedback people receive in everyday life. To produce more generalizable insights, future research should investigate the effects of self-relevant feedback on actual self-concept change in natural settings, for example, using field experiments.

Furthermore, future research should systematically investigate the interplay of feedback, person, and study design characteristics in producing self-concept change, especially when aiming to investigate conditions under which a positivity or negativity bias emerges. While we systematically examined the role of certain aspects, such as the frequency of feedback, we used a similar paradigm and kept other context factors constant in Studies 2, 3, and 4. Conducting additional research systematically examining the impact of other factors such as content, source, and format of the feedback would be a further step in understanding self-concept change after self-relevant feedback. Moreover, we did not investigate the effects of personal characteristics even though there is evidence that they play an important role in reactions to feedback. People with depressive symptoms, for example, have been shown to be less optimistically biased in belief updating than those without such symptoms (Korn et al., 2014; Kube et al., 2019). Similar effects have been shown in the domain of social anxiety (Koban et al., 2017) and dispositional risk aversion (Niv et al., 2012). Furthermore, previous studies as well as

exploratory analyses for the current studies (see Online Supplemental Materials) have demonstrated gender differences in self-concept change after discrepant feedback (Ertac, 2011; Möbius et al., 2022), some of them showing, for example, that women are less optimistic or even more pessimistic in updating their beliefs after feedback (Study 4 of the current research; Ertac, 2011). A person's confidence regarding their prior (i.e., initial self-concept) has been identified as a relevant determinant for their reaction to the feedback, as well (Ertac, 2011). Yet, in Study 2, we randomly assigned participants to feedback of different sizes and directions; at least in this particular study, the negativity bias we found does not seem to be produced by interindividual differences. Nevertheless, examining the interplay between feedback, study design, and personal characteristics could produce valuable insights into the mechanisms underlying differential reactions to feedback.

Another issue raised by our findings is the question of whether motives for self-enhancement and self-improvement are the driving factor behind biased self-concept change. While this has been presumed in previous research (Müller-Pinzler et al., 2019), the present research does not support such theorizing. Future research should further investigate their role, either by more directly assessing the motives themselves or by improving indirect approaches such as through opportunity for improvement. The latter could be done by manipulating the opportunity for improvement via different traits that are perceived as more or less malleable instead of using the same trait. Furthermore, instead of realizing a "low" opportunity for improvement condition (as we did in Study 4), it might be necessary to induce the perception that there is no opportunity for improvement at all. In addition, other explanations such as the diagnosticity of self-relevant information should be examined more directly. From our perspective, it would firstly be interesting to further examine whether negative information is perceived as more diagnostic than positive information in the context of self-relevant feedback. Secondly, identifying factors that inverse diagnosticity is key to explaining the contradictory findings on positivity and negativity biases in self-concept change.

Conclusion

Self-relevant feedback provides people with external information about themselves and impacts their self-concepts. However, feedback is not always integrated into the self-concept in a way that results in an accurate representation of the world. Consistent with previous research, we find that larger discrepancies are associated with more self-concept change. Contrary to several previous studies, however, we find that negative feedback is overweighed in comparison to positive feedback, resulting in negatively biased self-concept change. Aiming to explain when self-concept change after feedback is negatively versus positively biased, we find no evidence that the opportunity for improvement causes biased self-concept change.

References

Bem, D. J. (1972). Self-perception theory. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (Vol. 6, pp. 1–62). Academic Press. https://doi.org/10.1016/S0065-2601(08)60024-6

Bergin, A. E. (1962). The effect of dissonant persuasive communications upon changes in a self-referring attitude1. *Journal of Personality*, *30*(3), 423–438. https://doi.org/10.1111/j.1467-6494.1962.tb02314.x

Binderman, R. M., Fretz, B. R., Scott, N. A., & Abrams, M. H. (1972). Effects of interpreter credibility and discrepancy level of results on responses to test results. *Journal of Counseling Psychology*, *19*, 399–403. https://doi.org/10.1037/h0033232

Bölte, S. (2005). *Reading the Mind in the Eyes Test für Erwachsene (dt. Fassung) von S. Baron-Cohen.* Germany: J.W. Goethe-Universität Frankfurt/M.

Buunk, A. P., & Gibbons, F. X. (2007). Social comparison: The end of a theory and the emergence of a field. *Organizational Behavior and Human Decision Processes*, *102*(1), 3–21. https://doi.org/10.1016/j.obhdp.2006.09.007

De Castella, K., & Byrne, D. (2015). My intelligence may be more malleable than yours: The revised implicit theories of intelligence (self-theory) scale is a better predictor of achievement, motivation, and student disengagement. *European Journal of Psychology of Education*, *30*(3), 245–267. https://doi.org/10.1007/s10212-015-0244-y

Dunning, D. (1995). Trait importance and modifiability as factors influencing self-assessment and self-enhancement motives. *Personality and Social Psychology Bulletin*, *21*(12), 1297–1306. https://doi.org/10.1177/01461672952112007

Dweck, C. S., Chiu, C., & Hong, Y. (1995). Implicit theories and their role in judgments and reactions: A word from two perspectives. *Psychological Inquiry*, *6*(4), 267–285. https://doi.org/10.1207/s15327965pli0604_1

Eil, D., & Rao, J. M. (2011). The good news-bad news effect: Asymmetric processing of objective information about yourself. *American Economic Journal: Microeconomics*, *3*(2), 114–138. https://doi.org/10.1257/mic.3.2.114

Elder, J., Davis, T., & Hughes, B. L. (2022). Learning about the self: Motives for coherence and positivity constrain learning from self-relevant social feedback. *Psychological Science*, *33*(4), 629–647. https://doi.org/10.1177/09567976211045934

Ertac, S. (2011). Does self-relevance affect information processing? Experimental evidence on the response to performance and non-performance feedback. *Journal of Economic Behavior & Organization*, *80*(3), 532–545. https://doi.org/10.1016/j.jebo.2011.05.012

Faul, F., Erdfelder, E., Lang, A.-G., & Buchner, A. (2007). G*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods*, *39*(2), 175–191. https://doi.org/10.3758/BF03193146

Formann, A. K., Waldherr, K., & Piswanger, K. (2011). *Wiener Matrizen-Test 2 (WMT-2): Ein Rasch-skaldierter sprachfreier Kurztest zu Erfassung der Intelligenz [Viennese Matrices Test 2 (WMT-2): A Rasch-scaled culture-fair short intelligence test].* Beltz Test, Hogrefe.

Heine, S. J., & Hamamura, T. (2007). In search of east asian self-enhancement. *Personality and Social Psychology Review*, *11*(1), 4–27. https://doi.org/10.1177/1088868306294587

Henss, L., & Pinquart, M. (2022). Dispositional and situational predictors of coping with violated achievement expectations. *Quarterly Journal of Experimental Psychology*, *75*(6), 1121–1134. https://doi.org/10.1177/17470218211048108

Hughes, J., & Beiner, D. (2021). *Reghelper: Helper functions for regression analysis. R package version 1.1.0.* https://CRAN.R-project.org/package=reghelper

Kernis, M. H., & Goldman, B. M. (2003). Stability and variability in self-concept and self-esteem. In M. R. Leary & J. P. Tagney (Eds.), *Handbook of self and identity* (pp. 106–127). The Guilford Press.

Kersting, M., Althoff, K., & Jäger, A. O. (2008). *Wilde-Intelligenz-Test 2: WIT-2.* Göttingen: Hogrefe.

Koban, L., Schneider, R., Ashar, Y. K., Andrews-Hanna, J. R., Landy, L., Moscovitch, D. A., Wager, T. D., & Arch, J. J. (2017). Social anxiety is characterized by biased learning about performance and the self. *Emotion*, *17*(8), 1144–1155. https://doi.org/10.1037/emo0000296

Korn, C. W., Prehn, K., Park, S. Q., Walter, H., & Heekeren, H. R. (2012). Positively biased processing of self-relevant social feedback. *Journal of Neuroscience*, *32*(47), 16832–16844. https://doi.org/10.1523/JNEUROSCI.3016-12.2012

Korn, C. W., Sharot, T., Walter, H., Heekeren, H. R., & Dolan, R. J. (2014). Depression is related to an absence of optimistically biased belief updating about future life events. *Psychological Medicine*, *44*(3), 579–592. https://doi.org/10.1017/S0033291713001074

Kube, T., Kirchner, L., Lemmer, G., & Glombiewski, J. A. (2022). How the discrepancy between prior expectations and new information influences expectation updating in depression—The greater, the better? *Clinical Psychological Science*, *10*(3), 430–449. https://doi.org/10.1177/21677026211024644

Kube, T., Rief, W., Gollwitzer, M., Gärtner, T., & Glombiewski, J. A. (2019). Why dysfunctional expectations in depression persist – Results from two experimental studies investigating cognitive immunization. *Psychological Medicine*, *49*(9), 1532–1544. https://doi.org/10.1017/S0033291718002106

Kurman, J. (2006). Self-enhancement, self-regulation and self-improvement following failures. *British Journal of Social Psychology*, *45*(2), 339–356. https://doi.org/10.1348/014466605X42912

Lefebvre, G., Lebreton, M., Meyniel, F., Bourgeois-Gironde, S., & Palminteri, S. (2017). Behavioural and neural characterization of optimistic reinforcement learning. *Nature Human Behaviour*, *1*(4), Article 4. https://doi.org/10.1038/s41562-017-0067

Leising, D., Ostrovski, O., & Borkenau, P. (2012). Vocabulary for describing disliked persons is more differentiated than vocabulary for describing liked persons. *Journal of Research in Personality*, *46*(4), 393–396. https://doi.org/10.1016/j.jrp.2012.03.006

Levy, S. R., & Dweck, C. S. (1998). Trait- versus process-focused social judgment. *Social Cognition*, *16*(1), 151–172. https://doi.org/10.1521/soco.1998.16.1.151

Marsh, H. W., & Shavelson, R. (1985). Self-concept: Its multifaceted, hierarchical structure. *Educational Psychologist*, *20*(3), 107–123. https://doi.org/10.1207/s15326985ep2003_1

Möbius, M. M., Niederle, M., Niehaus, P., & Rosenblat, T. S. (2022). Managing self-confidence: Theory and experimental evidence. *Management Science*, *68*(11), 7793–7817. https://doi.org/10.1287/mnsc.2021.4294

Müller-Pinzler, L., Czekalla, N., Mayer, A. V., Stolz, D. S., Gazzola, V., Keysers, C., Paulus, F. M., & Krach, S. (2019). Negativity-bias in forming beliefs about own abilities. *Scientific Reports*, *9*(1), Article 1. https://doi.org/10.1038/s41598-019-50821-w

Niv, Y., Edlund, J. A., Dayan, P., & O'Doherty, J. P. (2012). Neural prediction errors reveal a risk-sensitive reinforcement-learning process in the human brain. *Journal of Neuroscience*, *32*(2), 551–562. https://doi.org/10.1523/JNEUROSCI.5498-10.2012

Norris, C. J. (2021). The negativity bias, revisited: Evidence from neuroscience measures and an individual differences approach. *Social Neuroscience*, *16*(1), 68–82. https://doi.org/10.1080/17470919.2019.1696225

R Core Team. (2018). R: A language and environment for statistical computing. R Foundation for Statistical Computing. *http://www.R-Project.Org/*.

Shavelson, R. J., Hubner, J. J., & Stanton, G. C. (1976). Self-concept: Validation of construct interpretations. *Review of Educational Research*, *46*(3), 407–441.

Shrauger, J. S., & Schoeneman, T. J. (1979). Symbolic interactionist view of self-concept: Through the looking glass darkly. *Psychological Bulletin*, *86*, 549–573. https://doi.org/10.1037/0033-2909.86.3.549

Strube, M. J. (2012). From “out there” to “in here”: Implications of self-evaluation motives for self-knowledge. In S. Vazire & T. D. Wilson (Eds.), *Handbook of self-knowledge* (pp. 397–412). The Guilford Press.

Taylor, S. E., & Brown, J. D. (1988). Illusion and well-being: A social psychological perspective on mental health. *Psychological Bulletin*, *103*, 193–210. https://doi.org/10.1037/0033-2909.103.2.193

Torchiano, M. (2020). *Effsize: A package for efficient effect size computation.* https://doi.org/10.5281/zenodo.1480624

Unkelbach, C., Alves, H., & Koch, A. (2020). Chapter Three - Negativity bias, positivity bias, and valence asymmetries: Explaining the differential processing of positive and negative information. In B. Gawronski (Ed.), *Advances in experimental social psychology* (Vol. 62, pp. 115–187). Academic Press. https://doi.org/10.1016/bs.aesp.2020.04.005

Vaish, A., Grossmann, T., & Woodward, A. (2008). Not all emotions are created equal: The negativity bias in social-emotional development. *Psychological Bulletin*, *134*, 383–403. https://doi.org/10.1037/0033-2909.134.3.383

6 Manuscript 2: I Think, Therefore I Change: Reflection Leads to Self-Concept Change After Discrepant Feedback

This manuscript has been published:

Brotzeller, F., Spägele, G. L., & Gollwitzer, M. (2025). I think, therefore I change: Reflection leads to self-concept change after discrepant feedback. *Personality and Social Psychology Bulletin*, 01461672251333466. https://doi.org/10.1177/01461672251333466

I Think, Therefore I Change:

Reflection Leads to Self-Concept Change After Discrepant Feedback

Franziska Brotzeller[a], Gideon L. Spägele[a], & Mario Gollwitzer[a]

[a] Department of Psychology, Ludwig-Maximilians-Universität München

Author Note

Franziska Brotzeller https://orcid.org/0009-0002-3069-1503

Study materials, data sets, and analysis scripts are openly available at the project's Open Science Framework page (https://osf.io/cfvjs/). Studies 1a-e were originally designed to test other research questions (see preregistrations at https://aspredicted.org/31S_M1M for Study 1a; https://aspredicted.org/VYH_M31 for Study 1b; https://aspredicted.org/3TQ_Y5S for Study 1d; https://aspredicted.org/R33_23D for Study 1e; Study 1c was not preregistered). Thus, the hypotheses tested here differ from those that were preregistered for those studies. Study 2 is reported here exactly as it was preregistered (https://aspredicted.org/12F_H31).

We would like to thank several people for their help in creating study materials and collecting data: Elena Cadeggianini for her help with Study 1a, Nia Pavlova for her help with Study 1b, Elèna Lombardo for her help with Study 1c, Veronika Fischer, Alina Kolb, Emma Runge, Vivian Swoboda, and Leonie Thürmer for their help with Study 1e, and Benedikt Ruhdorfer as well as David Wetterich for their help with Study 2. This research has been conducted without external funding. We have no conflicts of interest to disclose.

Correspondence concerning this article should be addressed to Franziska Brotzeller, Department of Psychology, Ludwig-Maximilians-Universität München, Leopoldstraße 13, 80802 Munich, Germany. Email: f.brotzeller@psy.lmu.de

Word count: 11,612

Abstract

Why do people change their self-perceptions (i.e., self-concept) after receiving external, self-discrepant information? While recent theorizing posits that reflection is a prerequisite for such change, empirical evidence supporting this is sparse. Here, we investigated the role of reflection in self-concept change after feedback in six studies. In Studies 1a-e (total *N* = 2,422), participants received feedback regarding a self-concept domain and we assessed reflection as well as self-concept change. Across studies, the amount of reflection was positively correlated with self-concept change. In Study 2 (*N* = 1,149), we experimentally varied whether participants were encouraged to reflect on the feedback and their self-concept or prevented from doing so via a distractor task. We found that self-concept change was larger after inducing (vs. suppressing) reflection. Exploratory analyses showed that the association between reflection and self-concept change was more pronounced for negative than for positive feedback in Studies 1a-e, but not Study 2.

Keywords: reflection, self-concept, self-concept change, feedback

I Think, Therefore I Change:

Reflection Leads to Self-Concept Change After Discrepant Feedback

People's self-concept is generally stable. Yet, external information that is discrepant from their self-concept can sometimes lead to self-concept change (Brotzeller & Gollwitzer, 2024; Elder et al., 2022; Müller-Pinzler et al., 2019). Such self-concept change can occur on different dimensions of the self-concept, which encompasses all self-perceptions a person holds (Shavelson et al., 1976). A person might, for example, think of themselves as a hard worker. But when their boss says that they are not investing enough time and energy into work, this discrepancy may make them re-think their self-concept of being a hard worker. While receiving feedback only once or observing just one single instance of discrepant behavior might lead to small changes in a person's self-concept, receiving discrepant feedback repeatedly may alter one's self-concept more profoundly and sustainably (Bleidorn et al., 2018). But what is the psychological mechanism linking everyday experiences to self-concept change?

Theoretical accounts (e.g., the TESSERA framework or the literature on wisdom and narrative identity; see below) posit that long-term change occurs when people reflect on self-relevant experiences as this helps them gain self-knowledge and integrate their experiences into their self-concept (Glück & Weststrate, 2022; McAdams & McLean, 2013; Wrzus & Roberts, 2017). However, there is little empirical evidence for an association between reflection and self-concept change so far (Quintus et al., 2021; Wrzus, 2021). Even less is known about the factors that might impact this association. The present research aims to fill these gaps by investigating the association between reflection and self-concept change as well as exploring one potential moderator: the direction of discrepancy, that is, whether the feedback negatively or positively deviates from a person's self-concept.

Conceptualizing Reflection

There are different conceptualizations of reflection about self-relevant experiences. An early

conceptualization defines reflection as the "process of creating and clarifying the meaning of experience (present or past) in terms of self" that results in a changed conceptual perspective (Boyd & Fales, 1983, p. 101). In a literature review, Rogers (2001) finds that reflection is often conceptualized as an active cognitive and affective process that is triggered by certain situations and during which new information can be contrasted with and later integrated into existing beliefs. Both definitions imply that reflection has important functions for the self. When a person encounters new and potentially discrepant information about themselves, this might trigger aversive emotions (e.g., shame, in case of negative information). Reflecting on the new information can then help process the information, regulate oneself, and potentially reevaluate one's self-concept. This is consistent with the literature on self-reflection and self-awareness, which highlights a link between these constructs and self-regulation as well as self-evaluation (Morin, 2011; Tangney & Tracy, 2012). More recent conceptualizations of reflection build upon these earlier works; yet, the definitions of reflection are often less detailed. For instance, Wrzus and Roberts (2017) describe reflection as "consciously thinking about one's past experiences, behavior, thoughts, and feelings" (p. 261).

In an attempt to create a comprehensive, yet concise definition of reflection based on existing definitions and the elements highlighted by Rogers (2001), we define reflection as a process during which individuals cognitively engage with self-relevant experiences and potentially integrate them into their existing beliefs. In the present research, we are especially interested in self-concept change resulting from an integration of new information into the existing self-concept (Brotzeller & Gollwitzer, 2024).

The Effect of Reflection on Self-Concept Change

One prominent theoretical model highlighting the role of reflection for changes in people's self-concept regarding their personality is the TESSERA framework (Wrzus & Roberts, 2017). The authors propose that reoccurring sequences of self-relevant experiences lead to changes in self-perceptions via

reflective processes. They specify that these self-relevant experiences consist of several elements: First, a triggering situation (e.g., a person being asked to take over a task at work) creates an expectation regarding a thought, feeling, or behavior that a person should display (the expectation can be either internal or external, e.g., the boss expecting a conscientiously completed task). In response to the triggering situation and the expectation, the person displays a state or state expression (e.g., the person works on the task conscientiously), followed by a reaction to the state or state expression (either by oneself or by someone else, e.g., the boss gives positive feedback on the task result). One or several such sequences make the person reflect on the reactions they have received. Such reflection about the reactions and their implications for one's self-concept is assumed to be the pathway to changes in the explicit self-concept. Importantly, while the TESSERA framework also covers changes in implicit personality or in personality observed by others, our research specifically focuses on self-concept change, which refers to changes in self-perceptions people hold.

While the framework focuses on changes in the personality self-concept, Wrzus and Roberts (2017) argue that the framework applies to other domains of the self-concept as well. This is in line with theorizing in other areas, suggesting that reflection is decisive for changes regarding all domains of the self-concept. The literature on narrative identity, for example, proposes that people actively reflect on difficult experiences to increase their self-understanding and integrate these experiences into their identity, which can contain all kinds of self-related information (McAdams & McLean, 2013; Pals, 2006). Moreover, the wisdom literature regards reflection on one's life experiences, mistakes, and successes as decisive in gaining self-insight as well as questioning and adapting one's self-views (Glück & Weststrate, 2022).

Despite these theoretical arguments for a link between reflection and self-concept change, little empirical research has *directly* tested this link. Previous research that is relevant in that regard provides merely indirect evidence for the role of reflection in self-concept change after discrepant feedback. For

instance, Sedikides and Skowronski (1995) asked participants to name and rate the importance of sources of self-knowledge and found that participants rated activities related to self-reflection as highly important (e.g., remembering past interactions or relationships). But this study did not look at self-concept change. In a more recent study, Miller (2020) examined how engaging in reflective activities helped healthcare leaders gain self-knowledge after stressful situations. They report responses from 17 participants rating the degree to which the reflective activities increased their self-knowledge, finding that those who more often engaged in reflective activities also reported larger gains in self-knowledge. Yet, they examined only self-reported gains in self-knowledge and also did not measure actual changes in participants' self-concepts. This, in addition to the very small sample size, limits the conclusions that can be drawn from this study regarding our research question: whether reflection after self-discrepant feedback positively predicts self-concept change. The most direct evidence for a link between reflection and self-concept change comes from a study by Quintus et al. (2021). In several waves of daily diary assessments over a period of 2 years, the authors assessed participants' daily experiences, states, and their reflection on these experiences. Furthermore, they measured participants' explicit personality self-concept regarding the Big Five traits at several measurement occasions throughout the 2-year period. For conscientiousness, more extensive reflection in combination with more trait-relevant (i.e., conscientious) behavior led to larger increases in trait conscientiousness (Quintus et al., 2021). However, such an effect was not observed for the other Big Five traits. Thus, there was no strong evidence for reflection as the pathway to self-concept change in their study.

Despite theoretical models highlighting their importance, assuming that reflection in response to self-relevant experiences leads to self-concept change is not trivial. While self-concept change is one way of dealing with a self-relevant experience that is discrepant from one's self-concept, there are other options that do not require adapting one's self-concept. One option could be to dismiss the self-discrepant experience as irrelevant ("immunization;" see Brandtstädter & Greve, 1994). When a person

receives negative feedback regarding their work ethic from someone who dislikes them, for example, they can easily interpret the feedback as maliciously intended, invalid, or unreliable. Another option for dealing with self-discrepant experiences could be to adapt one's behavior in order to prevent such discrepancies in the future ("assimilation;" see Brandtstädter & Greve, 1994). A person receiving negative feedback about their work ethic could, for example, plan to invest more time and energy into their work in the future. Importantly, either of the two options can render self-concept change unnecessary: After dismissing feedback as irrelevant or adapting one's behavior to avoid similar feedback in the future, self-concept change is no longer necessary. Processing self-discrepant experiences during reflection, therefore, does not necessarily lead to self-concept change, but might also even reinforce one's initial self-concept (Quintus et al., 2021; Wrzus & Roberts, 2017). Previous research supports the assumption that reflecting on a self-discrepant experience can result in outcomes other than self-concept change: Several qualitative studies have shown that reflecting on feedback can produce (plans for) behavioral changes aimed at improving and, therefore, preventing discrepant feedback in the future (Boyd & Fales, 1983; Overeem et al., 2009; Sargeant et al., 2009). Moreover, a quantitative study on leadership development showed that structured reflection about relevant experiences (compared to a control group in which no structured reflection was induced) leads to more changes in leadership behaviors (DeRue et al., 2012).

In summary, while theoretical models such as the TESSERA framework as well as the literature on wisdom and narrative identity posit that reflection after self-relevant experiences leads to self-concept change, there are plausible theoretical arguments that speak against such an effect and few empirical studies supporting either position. To gain a better understanding of the cognitive processes that shape how the self-concept changes in light of external feedback, we think it is relevant to start with the broad question of whether and how reflection is involved in such change. This is what we aim to do in the present research. More specifically, our first goal is to study whether reflecting on a

discrepant, self-relevant information leads to self-concept change. In doing so, we build upon and extend previous research by examining how single instances of receiving self-relevant information contribute to self-concept change regarding specific aspects of the self-concept.

The Direction of Discrepancy as a Potential Moderator

While reflection is regarded as an important process that might lead to self-concept change, it is plausible to assume that several person and situation characteristics impact this association. The authors of the TESSERA framework propose, for example, that individual differences in self-evaluation motives or different ways of remembering and processing positive and negative information about the self might play a role (Wrzus, 2021; Wrzus & Roberts, 2017). In the present research, we focus on the latter aspect and, in addition to the main effect of reflection on self-concept change, explore the impact of negative versus positive information on that association. More specifically, we are interested in the effect of the direction of discrepancy, which describes whether the self-relevant information a person encounters is more negative or positive than their initial self-concept. There is a third case in which the feedback received does not deviate from one's self-concept. This case, however, is not interesting for the current research question. It will therefore be neglected in our theoretical argument as well as our analyses.

The comparison between negative and positive information is interesting because we know that both types of information are processed differently (Unkelbach et al., 2020). In the case of self-discrepant feedback, this implies that the process and the outcomes of reflecting about negative versus positive information differ. Negative information—feedback according to which one's abilities, performance, etc., is worse than expected—is arguably more threatening (Hakmiller, 1966) and may invoke defensive strategies that render self-concept change less likely than positive information—feedback suggesting that one is better than expected. In that regard, reflecting thoroughly, elaborately, and open-mindedly might be necessary to counteract such defensive reactions to negative feedback. It

is plausible, therefore, that the association between reflection and self-concept change is more pronounced after having received negative compared to positive self-discrepant information. Investigating this effect is a second goal of the present research.

The Present Research

We present six studies investigating the role of reflection in self-concept change after receiving self-relevant information. Furthermore, we explore the effects of the direction of discrepancy on this association. To do so, we applied a quantitative approach that enabled us to examine self-concept change at a fine-grained level. In all studies, we measured people's self-concept regarding a specific domain, asked them to complete a task or scale measuring this domain, and, subsequently, gave them feedback on their results. Afterwards, we measured participants' self-concept a second time. Applying a correlational approach in Studies 1a-e, we additionally assessed self-reported reflection after the feedback to examine whether it is associated with self-concept change. In Study 2, we experimentally induced or suppressed reflection and tested whether subsequent self-concept change differed between conditions. All studies were conducted online and with German-speaking participants.

Data, R codes for primary analyses, and supplemental materials are available online at https://osf.io/cfvjs/ for all studies. We report how we determined our sample size, all data exclusions, all manipulations, and all measures for all studies. All studies except for Study 1c were preregistered. Preregistrations can be found at https://aspredicted.org/31S_M1M for Study 1a, https://aspredicted.org/VYH_M31 for Study 1b, https://aspredicted.org/3TQ_Y5S for Study 1d, https://aspredicted.org/R33_23D for Study 1e. These preregistrations detail the study designs, pre-planned stopping rules, and exclusion criteria. As these studies had originally been designed to test other research questions, the hypotheses tested here differ from those that had been preregistered. The data from Studies 1d and 1e were used in a previous publication (Brotzeller & Gollwitzer, 2024). Study 2 was designed to replicate the (correlational) findings in Studies 1a-e with an experimental

design. The preregistration for Study 2 can be found at https://aspredicted.org/12F_H31.

Studies 1a-e

In Studies 1a-e, the association between reflection after self-relevant feedback and self-concept change was investigated using a correlational approach. To examine this association across a broad range of domains of the self-concept, we focused on a different self-concept domain in each study. We gave participants feedback regarding the respective self-concept domain and measured the extent of their reflection as well as self-concept change.

Method

Procedures and Measures

As the procedures and measures for Studies 1a-e are similar, an overview with examples from Study 1a is given in the following. Details on the procedures and measures for all studies can be found in Table 1. The full study materials for all studies are available at https://osf.io/cfvjs/. In all five studies, participants were first informed which domain of the self-concept the study would focus on (e.g., weight estimation abilities in Study 1a). Participants were given a description of and indicated their self-perception regarding this self-concept domain (e.g., via one item in Study 1a: "How good do you think you are at estimating the weight of objects or living beings?," scale from 0% = *very bad* to 100% = *very good*). In case the self-perception was not already assessed in a percentage format (cf. Table 1), participants were informed which percentage their self-rating corresponded to. This was done to ensure that self-perceptions were directly comparable to the feedback participants received later in the study. After indicating their self-perceptions, participants completed either a task with several subtasks or a scale measuring their level on the respective self-concept domain (e.g., a weight estimation task in Study 1a). They then received feedback regarding their result on this task or scale (e.g., "Your answers on the estimation test have been evaluated. On a scale from 0% [very bad estimation ability] to 100% [very good estimation ability] you are at: 75%" in Study 1a). The feedback was always presented to them in

the same percentage format used for their self-perceptions.

In Studies 1a-d, the feedback was real and reflected participants' actual task performance. In Study 1e, participants received fake feedback as we manipulated the direction and the size of the discrepancy: Participants' feedback was randomly assigned to be either more negative or more positive than their self-perceptions and to deviate by either a small amount (i.e., around 5%) or a large amount (i.e., around 20%) from their self-perceptions.[16] After having received feedback, participants again indicated their self-perceptions regarding the self-concept domain on the same item(s) used at the beginning of the study. Self-concept change scores were created by calculating the absolute value of the difference between the first and second self-concept measurement.

Participants further rated how much they had reflected on their level on the self-concept domain and the feedback during the study (e.g., via one item in Study 1a: "During the course of the study, I thought a lot about my self-assessment of my ability to estimate weights and about my feedback on the estimation test," scale from 1 = *strongly disagree* to 6 = *strongly agree*). The specific items measuring reflection in each of the five studies, respectively, are reported in the last column of Table 1.[17]

---

[16] Participants were debriefed and informed about the deception at the end of the study. Participants who terminated the study before finishing it and did not reach out to the contact person mentioned on each page of the questionnaire could not be contacted for a debriefing.

[17] All studies contained further measures and, in some cases, experimental manipulations as the studies were geared towards examining different research questions. The additional variables included exploratory and control variables as well as several attention checks and a "use-me" item. The latter two were used for excluding participants in accordance with the criteria specified in our preregistrations. The experimental manipulations include an experimental variation in the information communicated to participants on the hypotheses held by the researchers (Study 1a) or on the malleability of the ability in question (Study 1d), and an induction of different motives when working on the task (Study 1c). As these additional measures and manipulations are not relevant to the present research, they will not be further discussed. The full materials for all studies are available at https://osf.io/cfvjs/.

Table 6.1

Overview of Studies 1a-e

Study	SCD	Measurement of SCD	Task/scale	Feedback	Measurement of reflection
1a	Weight estimation	"How good do you think you are at estimating the weight of objects or living beings?," scale from 0% = *very bad* to 100% = *very good*; M_{t1} = 46.21, SD_{t1} = 21.09; M_{t2} = 33.64, SD_{t2} = 17.73; M_{SCC} = 15.41, SD_{SCC} = 14.39	Weight estimation task with 12 subtasks in which participants were presented an object or living being and had to choose the correct of four options for its weight; the task was self-created	"Your answers on the estimation test have been evaluated. On a scale from 0% (*very bad estimation ability*) to 100% (*very good estimation ability*) you are at: [RESULT]%"; real feedback representing the percentage of correctly solved subtasks	"During the course of the study, I thought a lot about my self-assessment of my ability to estimate weights and about my feedback on the estimation test," scale from 1 = *strongly disagree* to 6 = *strongly agree*; *M* = 3.74, *SD* = 1.20
1b	Health-conscious lifestyle	"How health-conscious do you consider your lifestyle to be? When answering, please refer to the last 6 months," scale from 0% = *not at all heath-conscious* to 100% = *very health-conscious*; M_{t1} = 63.74, SD_{t1} = 19.55; M_{t2} = 65.86, SD_{t2} = 16.84; M_{SCC} = 5.40, SD_{SCC} = 6.60	Scale assessing how health-conscious a person's lifestyle is via items from five categories (e.g., nutrition, sports, sleep, and stress; adapted from Rodriguez Añez et al., 2008; Wilson et al., 1984)	"Your answers on the lifestyle scale were evaluated. On a scale from 0% (not at all health-conscious) to 100% (very health-conscious lifestyle) you are at: [RESULT]%"; real feedback representing a point score that sums up responses to the items and is converted to a percentage score for the feedback (point scoring adapted from Rodriguez Añez et al., 2008)	"During the course of the study, I thought a lot about my self-assessment and my feedback on the lifestyle scale," scale from 1 = *strongly disagree* to 6 = *strongly agree*; *M* = 3.72, *SD* = 1.23
1c	General knowledge	"My general knowledge is as good as or better than that of ____ of the German-speaking population," scale from 0% to 100%; M_{t1} = 59.07, SD_{t1} = 17.55;	General knowledge test with 10 questions (adapted from Trepte & Verbeet, 2010)	"Based on your answers in the general knowledge test, your general knowledge is as good as or better than that of [RESULT]% of the reference group," real feedback representing the participant's percentile score compared to a reference group of	"During the course of the study, I thought a lot about my self-assessment and my feedback on the general knowledge test," scale from 1 = *strongly disagree* to 6 = *strongly agree*; *M* = 3.59, *SD* = 1.13

		M_{t2} = 59.90, SD_{t2} = 19.43; M_{SCC} = 10.19, SD_{SCC} = 11.10		>160,000 German-speakers (Trepte & Verbeet, 2021)	
1d	Emotion recognition	Four items, for example, "It's very easy for me to read a person's emotions from their eyes," scale from 1 = *strongly disagree* to 9 = *strongly agree*; α_{t1} = .94, M_{t1} = 5.10, SD_{t1} = 1.73; α_{t2} = .94, M_{t2} = 4.84, SD_{t2} = 1.59; M_{SCC} = 0.90, SD_{SCC} = 0.93	Emotion recognition task with 10 subtasks in which participants were presented photos of human eye areas and had to choose the correct one out of four options given for the emotion the person might be feeling (adapted from Bölte, 2005)	"Your percentage of correct answers in the photo task was: [RESULT]%"; real feedback representing the percentage of correctly solved subtasks	"How much did you think about your feedback on your self-assessment and the photo task during the course of the study?," scale from 1 = *very little* to 9 = *very much*; *M* = 5.22, *SD* = 1.82
1e	Visual-spatial ability	Five items, for example, "I find it very easy to examine objects from different spatial perspectives in my imagination," scale from 1 = *strongly disagree* to 9 = *strongly agree*; α_{t1} = .82, M_{t1} = 5.65, SD_{t1} = 1.29; α_{t2} = .90, M_{t2} = 5.34, SD_{t2} = 1.65; M_{SCC} = 0.76, SD_{SCC} = 0.71	Visual-spatial ability tasks with subtasks in which participants had to mentally manipulate objects to solve problems (adapted from Formann et al., 2011; Kersting et al., 2008); due to an experimental manipulation, participants completed either one or three tasks with 18 or 20 subtasks each and received feedback on each completed task (for more information, see https://osf.io/cfvjs/)	"You have solved [RESULT]% of the tasks correctly"; fake feedback supposedly representing the percentage of correctly solved subtasks; feedback was either positive or negative and differed from participants' self-perceptions by a smaller or larger amount (for more information see https://osf.io/cfvjs/)	"I reflected a lot on the feedback I received about my ability for spatio-visual thinking during the study," scale from 1 = *strongly disagree* to 5 = *strongly agree*; *M* = 2.93, *SD* = 1.15

Note. SCD = self-concept domain, SCC = self-concept change. [RESULT] stands for the result a participant achieved in the respective task or scale.

Samples

For all studies, participants were recruited through (university) mailing lists and, in some cases, via social media postings and personal networks. In return for their participation, participants were given the opportunity to participate in a raffle for vouchers or to receive course credit. For all preregistered studies, we collected data and applied exclusion criteria as delineated in the respective preregistration, except for one additional exclusion criterion applied in Study 1d (see below for an explanation). In Study 1c, which was not preregistered, we collected data for one month and applied the same exclusion criteria as in Studies 1a and 1b.[18]

Study 1a. In total, 667 participants completed the study within the preregistered time frame. After applying the preregistered exclusion criteria, the final sample consisted of N = 592 participants (M_{age} = 31.05, SD_{age} = 14.49; 412 female, 170 male, 10 “other”).

Study 1b. Within the preregistered time frame, 654 participants completed the study. Applying the preregistered exclusion criteria resulted in a final sample of N = 544 participants (M_{age} = 36.10, SD_{age} = 15.16; 401 female, 133 male, 10 “other”).

Study 1c. A total of 587 participants completed the study within a time frame of one month. After applying the same exclusion criteria as in Studies 1a and 1b, the final sample consisted of N = 460 participants (M_{age} = 34.75, SD_{age} = 15.47; 313 female, 140 male, seven “other”).

Study 1d. In total, 548 participants completed the study within the preregistered time frame. After applying the preregistered exclusion criteria, our sample consisted of n = 459 participants. We applied one additional exclusion criterion: As our goal was to examine responses to discrepant feedback,

[18] Details on the exclusions per criterion and, if applicable, experimental condition can be found at https://osf.io/cfvjs/ for all studies.

we excluded n = 6 further participants with no discrepancy between feedback and initial self-concept.[19] Our final sample thus comprised of N = 453 (M_{age} = 32.61, SD_{age} = 14.03; 331 female, 114 male, eight "other").

Study 1e. A total of 627 participants completed the study within the preregistered time frame. We applied the preregistered exclusion criteria, which led to a final sample of N = 373 participants (M_{age} = 29.33, SD_{age} = 12.50; 290 female, 77 male, five "other," one did not respond).

Results

We used R to conduct all analyses (R Core Team, 2023). In preparation for our analyses, we rescaled the reflection and self-concept change variables to be consistent between studies. Rescaled reflection values ranged from 0 = *low* to 5 = *high reflection* for all studies, while rescaled self-concept change values ranged from 0 = *no* to 8 = *maximum change*.[20]

Main Analysis

For our main analysis, we used the combined data from all five studies with a total N = 2,422. This also meant that our data had a multilevel structure as participants were nested within studies. Therefore, we used multilevel modeling to analyze our data, which was proposed by Raudenbush and Bryk (1985) for meta-analytic procedures in which results are analyzed across studies. Such approaches, in which the original data for each participant are included in the analyses instead of using aggregate data, are also called individual participant data (IPD) meta-analyses. Due to their many advantages over

[19] Conducting our analyses without these additional exclusions, the patterns and significances of our results are consistent with the ones reported in the manuscript.

[20] While we measured reflection via self-report in Studies 1a-e, we explored participants' completion times as an additional proxy for reflection. To do so, we used a measure of total completion time corrected for extreme times of several hours, which is automatically provided by our online survey platform SoSci Survey (Leiner, 2021). The correlation between self-reported reflection and our index of total completion time was small but significant, r = .07, p < .001.

meta-analytic approaches that merely take the study-level effect size estimators (and their standard errors) into account, IPD meta-analyses are currently considered the gold standard (Rakshasbhuvankar, 2021).

Based on the combined collected data, we conducted simulations to estimate the statistical power to detect the main effect of interest in our multilevel model using the simr package (Green & MacLeod, 2016). Assuming $\alpha = .05$ and $1-\beta = .80$, our sample size was sufficient to detect significant effects as small as $B = 0.04$. Further details are provided in the supplementary materials on OSF.

To analyze our data, we specified a random intercept model including absolute self-concept change as the dependent variable, reflection as a fixed effect, and study as a random factor.[21] To do so, we used the lme4 package in R and parameters were estimated via restricted maximum likelihood estimation (Bates et al., 2015). Our results are summarized in Table 2. Reflection emerged as a significant predictor of self-concept change, $B = 0.15$, $p < .001$.

Exploratory Analyses

Next, we explored the effect of the direction of discrepancy on the association between reflection and self-concept change. In preparation for this analysis, we created the scores for the direction of discrepancy. In Studies 1a-1d, we compared participants' initial self-concept with their task scores (both variables are comparable because we used percentage values; see above). Cases in which task scores were lower than the self-concept were coded as a "negative discrepancy," cases in which task scores exceeded the self-concept were coded as a "positive discrepancy". Cases in which the discrepancy was 0 were excluded from our analyses as outlined in the samples description. In Study 1e, direction of discrepancy was manipulated in the feedback participants received. For our analyses, we

[21] We did not include reflection as a random factor as the variance of the random slopes in this model was near zero, which can lead to overfitting and a reduced power.

effect-coded the direction of discrepancy variable for all studies (i.e., “negative” = -1, “positive” = 1).

To investigate the effect of the direction of discrepancy on the association between reflection and self-concept change, we again calculated a random intercept model with the combined data set, this time including the direction of discrepancy as well as its interaction with reflection as additional fixed effects.[22] The results are displayed in Table 2. The interaction effect between reflection and the direction of discrepancy was significant, $B = -0.07$, $p < .001$.[23] To explore this effect further, we conducted simple slopes analyses using the reghelper package (Hughes & Beiner, 2021). We found that even though the association between reflection and self-concept change was significant in both groups, it was stronger for negative, $B = 0.22$, $SE = 0.02$, $t(2{,}414.55) = 10.58$, $p < .001$, than for positive discrepancies, $B = 0.07$, $SE = 0.02$, $t(2414.68) = 3.87$, $p < .001$.

[22] Again, we report the random intercept model here because the full random coefficients model yielded random slopes variances close to zero. In a model including the direction of discrepancy as a random factor, the patterns and significances of the fixed effects of reflection, the direction of discrepancy, and their interaction remain the same as in the analyses reported here.

[23] We specified an additional random intercept model in which we included the size of discrepancy (i.e., the absolute difference between feedback and initial self-perceptions) as a control variable. While the size of discrepancy emerged as a significant predictor, the patterns and significances of all other fixed effects remained the same. The full results can be found at https://osf.io/cfvjs/.

Table 6.2

Multilevel Regression Model Results for Self-Concept Change

Model parameters and variance components	Main Analysis	Exploratory Analysis
(Intercept)	0.44 * (0.13)	0.45 ** (0.11)
Reflection	0.15 *** (0.01)	0.15 *** (0.01)
DoD		0.02 (0.04)
Reflection × DoD		-0.07 *** (0.01)
$SD_{\text{Random Intercept}}$	0.28	0.23
$SD_{\text{Level-1-Residual}}$	0.86	0.84
R^2	0.133	0.148

Note. Standard errors are displayed within parentheses. *N* = 2,422. DoD = Direction of Discrepancy. DoD: negative = -1, positive = 1.

* $p < .05$. ** $p < .01$. *** $p < .001$.

Discussion

Our results provide correlational evidence for a positive association between reflection and self-concept change, which is in line with the literature on personality change, wisdom, and narrative identity. Across a variety of self-relevant domains, we found that the more a person reflects about discrepant, self-relevant feedback and its implications for the self-concept, the larger the changes in

their self-concept. In exploratory analyses, we furthermore found that this association is stronger after receiving negative feedback (i.e., worse than expected) compared to positive feedback (i.e., better than expected). One drawback of all of these studies is that they only provide correlational evidence for a link between reflection and self-concept change. Yet, in the respective literatures, such as the TESSERA framework, reflection is considered a necessary condition for self-concept change after receiving self-relevant feedback. The first five studies reported here are unable to test this causality in a rigorous fashion. One alternative explanation for the findings we reported here could be that the correlation between reflection and self-concept change was produced by a common causal factor (such as self-concept clarity: lower self-concept clarity is associated with more self-reflection; Campbell et al., 1996; lower self-concept clarity is also associated with more self-concept change; Carter & Bruene, 2019). To test the causal effect of reflection on self-concept change after receiving discrepant feedback more rigorously, we decided to pursue an experimental approach in which we manipulated reflection experimentally.

Study 2

Study 2 was designed to test the effect of reflection on self-concept change after discrepant feedback in an experimental fashion. To do so, we used a similar design as in the previous studies but included an experimental manipulation geared towards either inducing or suppressing reflection.

Reflection on self-relevant information is a complex cognitive process that might include, for example, evaluating the relevance of the feedback or integrating it into one's existing beliefs. As such, reflection requires working memory capacity, a limited resource needed for temporarily storing and processing information (Baddeley, 1992; Hitch & Baddeley, 1976). In this study, we capitalized on the fact that working memory capacity is limited: By creating cognitive load through a distractor task in one of two experimental conditions, we aimed at occupying the available working memory capacity and, thus, at suppressing reflection about the feedback. Such an approach has been successfully applied to

limit the cognitive resources available for a specific task (Dijkstra & Hong, 2019; Johnson et al., 2014). In the other experimental condition, we aimed at inducing reflection by encouraging participants to reflect about the feedback and its implications via several prompts. Previous research has demonstrated that structured reflection via prompts can increase the depth as well as quality of reflection and is beneficial for learning outcomes (Cengiz, 2020; Chen et al., 2009; DeRue et al., 2012). We hypothesized that self-concept change would be larger after reflection was induced than after it was suppressed.[24]

Method

Procedures and Measures

Participants were informed that the study would consist of two blocks. They were told that the first block would be about *procedural thinking*, that is, the ability to grasp complex problems and solve them efficiently by imagining processes and/or spatial motion. Participants received a detailed definition of procedural thinking and were then asked to indicate their self-concept by rating their self-perceived ability for procedural thinking via four items (e.g., "I am able to quickly find effective solutions to procedural problems"; scale from 1 = *strongly disagree* to 6 = *strongly agree*; α_{t1} = .88; M_{t1} = 4.18, SD_{t1} = 0.83; adapted from Heppner & Petersen, 1982).

Next, they were asked to work on two sets of tasks measuring their ability for procedural thinking. The two sets were presented in random order. Each set of tasks consisted of five subtasks. Participants were tasked with solving as many subtasks as they could within a given time limit. In the first set of tasks, participants were shown several interconnected gear wheels. A starting cue indicated in which direction the first wheel turned. They were then asked to determine in which direction one or several of the other wheels turned. Each subtask displayed a different arrangement of gear wheels and

[24] Before conducting this study, we conducted a pilot study to test our experimental manipulation. The full materials as well as an overview of our findings can be found at https://osf.io/cfvjs/.

was considered correctly solved only if participants indicated the correct direction for all relevant gear wheels (tasks based on similar tasks by Bennett & Fry, 1969). The time limit for this set of tasks was 120s. The second set of tasks consisted of subtasks showing several spatial geometric figures. Participants had to mentally combine these figures. They were presented with four options of what the combined figure looked like and had to choose the correct one (tasks adapted from Berkowitz et al., 2020). The time limit for this set of tasks was 160s.

For all subtasks, participants received feedback on whether they had correctly solved the subtask directly after submitting their response. The feedback either read "Your answer is correct" or "Your answer is incorrect." If participants did not manage to respond to all subtasks within the time limit, the remaining subtasks were considered incorrectly solved; participants were informed accordingly for each unsolved task. In total, participants therefore received feedback ten times, once for each subtask.

After completing the two sets of tasks, the second block of the study began. At this point, participants were randomly assigned to one of the two experimental conditions. In the *inducing reflection* condition, participants were asked to take three to five minutes to reflect on their ability for procedural thinking. They were instructed to respond to several open-ended questions aimed at prompting in-depth reflection during this time. The questions were "After having indicated your self-perception and worked on the tasks on procedural thinking, what are you thinking right now?," "How did you perceive your ability for procedural thinking while working on the tasks?," "Regarding your self-perception and the tasks on procedural thinking, how are you feeling right now?," "Which insights did you gain after indicating your self-perception and working on the tasks on procedural thinking?," and "Do you have any further thoughts?." In the *suppressing reflection* condition, participants worked on a cognitively demanding distractor task: They were asked to repeatedly memorize lists of 10 sequentially presented nouns and reproduce them in a free recall format (words were taken from Kroneisen et al.,

2014). Similar tasks have been shown to demand cognitive resources (Kroneisen et al., 2014) and have been used to induce cognitive load in previous research (Kidder et al., 1997; Shears et al., 2007). After three trials of the memory task, participants were presented with a fourth list of nouns but were not immediately asked to reproduce them. Instead, they were asked to remember the nouns until they had to reproduce them at a later point in time.

All participants were then asked to again rate their self-perceived ability for procedural thinking via the same four items used at the beginning of the study (α_{t2} = .90; M_{t2} = 3.65, SD_{t2} = 1.06). Following the procedure applied in Studies 1a-e, we calculated the self-concept change score by subtracting participants mean self-rated ability at the first from that at the second measurement occasion. Absolute values of this score served as the final self-concept change score used in our analyses (M_{SCC} = 0.70, SD_{SCC} = 0.69). After their second self-rating, participants in the suppressing reflection condition were asked to reproduce the words they had memorized in the fourth trial of the memory task. In the end, we asked all participants to indicate how much they had reflected on their ability for procedural thinking (i.e., "After completing the procedural thinking tasks, I reflected extensively on my ability for procedural thinking," scale from 1 = *strongly disagree* to 6 = *strongly agree*; *M* = 3.31, *SD* = 1.15). This was used as a manipulation check.[25]

Sample

Participants were recruited through a university mailing list, personal networks, and the PsyWeb panel (see https://psyweb.uni-muenster.de/). In return for their participation, participants could take

[25] The study included several additional measures (e.g., an attention check, a use me-item, and measurements for frustration and diligence). Apart from the attention check and use me-item, which were applied to exclude participants as preregistered, these measures are not relevant to the present research and are therefore not further discussed. The full materials can be found at https://osf.io/cfvjs/.

part in a raffle for vouchers. We collected data until the date specified in our preregistration, which resulted in 1,399 data sets. We applied the preregistered exclusion criteria and excluded data from *n* = 145 participants. In addition, we again excluded participants with no discrepancy between feedback and initial self-concept as they were not relevant to our research question, resulting in *n* = 99 further exclusions.[26] Furthermore, we excluded the data from *n* = 6 participants who had participated more than once (i.e., their participant IDs occurred more than once in the dataset). Thus, the final sample consisted of *N* = 1,149 participants (M_{age} = 43.90 years, SD_{age} = 15.36 years; 732 female, 404 male, 12 "other," one non-response). According to a sensitivity power analysis conducted in G*Power (α = .05, 1-β = .80, sample size group 1 = 564, sample size group 2 = 585; Faul et al., 2007), we could detect an effect of Cohen's *d* = 0.15 for our main analysis with this sample.

Results

Manipulation Check

First, we conducted a manipulation check to determine whether our experimental manipulation was successful. Calculating a Welch's two-sample *t*-test, we found that self-reported reflection was higher in the inducing reflection condition (*M* = 3.46, *SD* = 1.17) than in the suppressing reflection condition (*M* = 3.16, *SD* = 1.10), $t(1135.70) = 4.44$, $p < .001$, Hedges' *g* = 0.26, 95% CI [0.15, 0.38] (effsize package; Torchiano, 2020).[27] Thus, our manipulation produced a small to medium sized effect on self-reported reflection.

[26] Conducting our analyses without these additional exclusions yields the same patterns and significances of results as those reported in the main manuscript.

[27] For both the manipulation check and the main analysis, Welch's *t*-test was chosen because the respective groups had unequal variances. The patterns and significances of our results remain the same when using Student's *t*-tests for the analyses.

Main Analysis

To test whether self-concept change was larger after inducing than after suppressing reflection, we calculated a Welch's two-sample *t*-test. We found the expected effects, with self-concept change being larger in the inducing (M = 0.76, SD = 0.74) than in the suppressing reflection condition (M = 0.64, SD = 0.63), $t(1100.20) = 2.79$, $p = .005$, Hedges' $g = 0.17$, 95% CI [0.05, 0.28] (effsize package; Torchiano, 2020).

Exploratory Analyses

Like in Studies 1a-e, we explored whether the effect of reflection on self-concept change was moderated by the direction of the discrepancy—that is, whether the effect was larger for negative compared to positive discrepancies. First, we computed the difference between self-perceptions at the first measurement occasion and task feedback scores; second, we dichotomized this variable into negative and positive discrepancies.

Next, we specified a multiple regression model with reflection ("suppressing reflection" = -1, "inducing reflection" = 1), direction of discrepancy ("negative" = -1 and "positive" = 1), and the interaction of the two as predictor terms and self-concept change as the dependent variable. Overall, the model explained 4% of the variance in self-concept change, $F(3, 1145) = 15.11$, $p < .001$, $R^2 = .04$, 95% CI [.02, .06]. Our analysis revealed significant main effects for reflection, $B = 0.06$, $t(1145) = 2.49$, $p = .013$, 95% CI for B [0.01, 0.11], $sr^2 = .01$, and direction of discrepancy, $B = -0.15$, $t(1145) = -6.10$, $p < .001$, 95% CI for B [-0.19, -0.10], $sr^2 = .03$. The interaction term was not significant, $B = -0.00$, $t(1145) = -0.09$, p

= .928, 95% CI for *B* [-0.05, 0.05], sr^2 = .00.[28,29]

Discussion

Consistent with the findings from Studies 1a-e, Study 2 provides experimental evidence that reflection leads to self-concept change after discrepant feedback. The small effect we observed is consistent with theoretical accounts as single instances of reflecting on self-relevant experiences should produce only small changes in the self-concept that should, over time and after repeated reflection on self-relevant experiences, condense into larger self-concept changes (e.g., Wrzus & Roberts, 2017). While we found that the association between reflection and self-concept change was larger for negative compared to positive discrepancies in Studies 1a-e, we did not find such a moderating effect in Study 2.

General Discussion

In six studies, we examined the association between reflection after self-relevant feedback and self-concept change. We further explored the effect of the direction of discrepancy on this association. Across different self-concept domains, we found that reflection was positively associated with self-concept change: The more participants reflected about the feedback and its implications for the self, the more they changed their self-concept. This is in line with recent theorizing on the mechanism behind changes in the self-concept (Wrzus & Roberts, 2017) and supports previous, tentative evidence for a link between reflection and self-concept change (Quintus et al., 2021). Regarding the direction of discrepancy as a moderator, the aggregated results from Studies 1a-e suggest that the association

---

[28] Like in our analyses for Studies 1a-e, we conducted an additional regression analysis in which we controlled for the size of discrepancy. Again, size of discrepancy emerged as a significant predictor, while the patterns as well as significances for the other effects remained the same. The results of our analysis can be found on OSF.

[29] To make our exploratory analysis more comparable with the analysis for Studies 1a-e, we conducted an additional analysis in which we used the self-reported reflection assessed as a manipulation check as our independent variable instead of the reflection conditions. The patterns and significances of our results remain the same. The results of our analysis can be found at https://osf.io/cfvjs/.

between reflection and self-concept change was more pronounced for negative than for positive discrepancies. In Study 2, the reflection × direction interaction was not significant. One potential issue with the design of Study 2 is that there were more participants receiving negative compared to positive feedback (i.e., task scores were more often worse [as compared to better] than participants' expectations indicated in their self-concept self-reports). This imbalance may have made it more difficult to detect small differences in the reflection effects between the groups. Future research should therefore examine the interaction between reflection and the direction of discrepancy in an experimental design that aims for a more balanced distribution of positive and negative deviations from one's prior expectations (i.e., self-concept).

Theoretical Implications

The present research adds to the existing literature by investigating the role of reflection after receiving self-discrepant feedback systematically, rigorously, and with considerable contextual breadth (i.e., for different self-concept domains, with different approaches, etc.). Theoretical work such as the TESSERA framework and research on narrative identities or wisdom have suggested reflection to be a decisive factor for self-concept change. Yet, little quantitative empirical research has tested this assumption. One initial test of the TESSERA framework examined the role of reflection in a longitudinal design (Quintus et al., 2021). Yet, this study did not look at single instances of receiving and reflecting on self-relevant feedback. Our own research allowed for a more fine-grained investigation of the link between reflection and self-concept change. We found that reflection was associated with self-concept change even after single instances of self-relevant feedback. In our studies, we examined a variety of self-concept dimensions, from intelligence subfacets (Studies 1c and 1e) to abilities (Studies 1a, 1d, and 2). Furthermore, we did not only use correlational designs, but also experimentally induced or suppressed reflection in Study 2 and found that inducing reflection led to more self-concept change than suppressing reflection.

Our findings contribute to the literature on self-concept change in several regards. First, our research provides a very conservative test of the theoretical idea that reflection is the pathway to self-concept change: In each study, we presented participants with self-relevant feedback and assessed or manipulated reflection as well as self-concept change. In doing so, we examined isolated instances of receiving and reflecting on self-relevant information. In line with theory, the effects we found in our studies are small. Over time and across several instances, these small effects should accumulate into larger changes in people's self-concept (Wrzus & Roberts, 2017).

Second, it is by no means trivial to assume that reflection is positively associated with self-concept change: Reflecting about self-discrepant feedback may also trigger cognitive processes that eventually stabilize one's self-concept. For instance, reflection might enable individuals to strategically shield their self-concept against self-discrepant feedback ("immunization" strategies; Brandtstädter & Greve, 1994). This might include denying the relevance of a discrepant information (e.g., "When my boss tells me I work too little this is irrelevant because she doesn't know how many hours I really work"; "data-oriented immunization") or redefining whether the discrepant information is self-relevant regarding the self-concept domain in question (e.g., "When my boss tells me I work too little, this doesn't impact my self-concept as a hard worker—how many hours I work is not relevant here, it's about how much I get done in the hours I do work"; "concept-oriented immunization"). In addition, reflection may motivate people to reduce self-concept discrepancies by trying to manage the impression they make on other people, or to work harder so that, next time, their actual abilities are more in line with their self-concept ("assimilation" strategies; Brandtstädter & Greve, 1994; Pinquart et al., 2021). Single instances of feedback—such as the ones we used here—might be particularly likely to invite immunization or assimilation strategies: It is easier to discredit a single feedback or avoid similar feedback in the future than to adapt one's self-concept. Supporting this notion, previous research in the context of expectation violations has shown that when expectation violations happen once or only

under specific circumstances, the inconsistent information is discredited or behavior changes are made rather than adapting one's expectations (Pietzsch & Pinquart, 2023). In light of these findings, it is particularly noteworthy that we consistently found a positive association between reflection and self-concept change even after single instances of feedback.[30]

As an additional contribution to the existing literature, we produce first evidence on the impact of the direction of discrepancy on the association between reflection and self-concept change. Previous research suggests that positive and negative information are processed differently, and that this might affect processes of self-concept change (Unkelbach et al., 2020; Wrzus & Roberts, 2017). In the present research, we found correlational evidence for a stronger link between reflection and self-concept change after negative than after positive feedback. In Study 2, however, we could not replicate these results in an experimental design. Therefore, while we find some evidence that reflection might produce more self-concept change after negative than after positive feedback, this effect should be further investigated in future studies.

Limitations and Future Research Directions

Despite its contributions to the literature on self-concept change, there are some limitations to the present research and avenues for future research arising from our results. One such limitation lies in our operationalization of reflection as well as self-concept change. When measuring or manipulating reflection, we targeted reflection in general without restricting its content. Furthermore, we measured and manipulated reflection shortly after participants had received self-relevant feedback. Yet, reflective processes can manifest in many different forms and range from briefly focusing one's attention on the

[30] In our studies, we collected preliminary data on some of the constructs mentioned here. In exploratory analyses comparing the two experimental conditions from Study 2, we did not find evidence that immunization or assimilation strategies differed depending on whether people were encouraged to or hindered from reflecting. More information on these analyses can be found on OSF.

feedback to engaging deeply with the implication of such feedback for one's self-concept and one's social interactions. There is currently no theoretical framework that helps inform us how long such processes last and which types of reflection should be most impactful in influencing self-concept change. Furthermore, it is plausible that people differ in how they process self-relevant information (Wrzus, 2021) and that situational factors impact how much and about what people reflect (e.g., people might reflect more in an artificial study design even after mildly discrepant feedback in comparison to a more naturalistic setting).

Similar points apply to self-concept change: While we measured self-concept change shortly after participants had received their feedback, it is plausible that such processes can last past this point and differ between individuals. Moreover, it is plausible that some aspects of the self might be more difficult to change than others (e.g., aspects that are central to a person's identity might be more difficult to change than peripheral aspects[31]). While we studied changes in different aspects of the self-concept in all studies, we were only able to examine a selection of potentially interesting aspects. Furthermore, the way we measured self-concept change enabled us to indirectly assess changes in self-perceptions. However, our measure was a self-report measure and suffered from shortcomings such as being influenced by motivated information processing, cognitive biases, or idiosyncratic motives (such as self-enhancement). That being said, self-reports are useful because they indicate the declarative aspects of a person's self-concept in the most direct fashion.

One might additionally argue that the self-concept changes we measured in our studies may not

[31] We assessed how relevant participants perceived the respective aspect of the self-concept to be for their identity in Studies 1b, 1c, 1d, and 2. Predicting self-concept change from reflection, relevance, and the interaction of the two in each study, the main effect of reflection was significant in all studies. Only in Study 1b, where the scale mean was comparably high with $M = 4.76$ ($SD = 0.97$) on a 6-point scale, there was a main effect of relevance: The more relevant the aspect of the self-concept was perceived to be, the smaller the changes in people's self-concept.

necessarily reflect "true" changes in one's self-concept, but rather participants' responses to the experimental demand that was created as part of our feedback paradigm. While this might, in principle, be a valid concern (Coles et al., 2023), it remains an empirical question to what extent our measured self-concept changes are influenced by demand effects. One way to look at this question empirically is to revisit the data collected in Studies 1a and 2. In Study 1a, the final part of the survey contained one question in which participants were asked to report their perception of the researchers' assumptions on whether they expected to find self-concept change after discrepant feedback or not. Adding participants' responses to that question as a moderator of the effect of reflection on self-concept change in Study 1a did not change the pattern of results (i.e., reflection was a significant predictor, and the interaction effect was not significant). More details on the results regarding the perceived researcher assumption, together with the results of an additional study on the role of demand effects in self-concept change after discrepant feedback, are reported in Brotzeller & Gollwitzer (2025). In Study 2, apart from directly measuring self-concept change, we also assessed participants' self-reported willingness to adapt their self-concept in response to the feedback. If the differences in self-concept change between reflection conditions were due to experimental demand, we would expect to find the same pattern of results for willingness to adapt the self-concept. This is not the case, however: An additional analysis comparing the mean willingness to adapt the self-concept in the two reflection conditions did not result in significant differences between groups. Based on these analyses, the assumption that our effects may have been merely the result of experimental demand seems unlikely.

Nevertheless, we acknowledge the limitations in our operationalization of reflection and self-concept change and call for future research to measure and manipulate reflection as well as self-concept change more comprehensively. This should be done in different settings as well as for a variety of self-concept aspects not yet studied in the present research to expand the generalizability of the findings. One focus for future research could lie in measuring the content and extent of reflection in

more detail and over a longer period to investigate its progression and gain deeper insights into its association with self-concept change. When manipulating reflection, future research might develop stronger experimental manipulations than the one we applied in Study 2. While we employed prompts as well as a distractor task, which had been found to be effective techniques for inducing and suppressing reflection (Chen et al., 2009; Shears et al., 2007), our manipulation check showed that this only produced a small to medium effect. To increase the effectiveness of such a manipulation, future research could, for example, improve the prompts that participants receive or increase the time spent on reflecting about self-discrepant feedback (and, in the contrasting condition, time spent working on the distractor task in order to suppress reflection). Furthermore, including a control condition in which reflection is neither suppressed nor induced would allow to determine whether the positive effect of inducing reflection on self-concept change is smaller or larger than the negative effect of suppressing reflection on self-concept change. This could help develop more effective experimental manipulations for future studies.

Moreover, while we only examined the main effect of reflection on self-concept change and merely looked at one potential moderator for this association (i.e., direction of discrepancy), future research should take into account further factors that might play a role in this context. Person characteristics of interest might, for example, be self-evaluation motives such as self-enhancement and self-verification (i.e., the motivations to view oneself as positively as possible and to confirm one's existing self-concept, respectively; Wrzus, 2021). Previous research has shown that how people perceive themselves does not merely reflect their past thoughts, feelings, and behaviors, but is also influenced by inaccurate information processing and motivational processes (Schriber & Robins, 2012). It seems plausible to assume that self-evaluation motives might also impact how one processes and reflects on self-discrepant information and subsequently adapts one's self-concept. Future research should examine these and other person characteristics that might be of interest here, such as intellectual

performance or personality traits (e.g., openness or need for cognition[32]). Another factor potentially playing a role might be the source of the self-discrepant information. Previous research has demonstrated, for example, that a higher source credibility is linked with a higher perceived feedback accuracy and feedback acceptance (Lechermeier & Fassnacht, 2018). It is plausible to assume that the source credibility might also impact the duration and content of reflection on discrepant feedback, with feedback from a more credible source leading to more in-depth reflection, which, in turn, is more likely to result in self-concept change. Feedback based on a task in a scientific study, for example, might be perceived as more credible than some forms of feedback a person receives in daily life, while it is likely less credible than others (e.g., it might be more credible than feedback from a stranger on the street but less credible than feedback from a family member who has known the person for years and has much more information to base the feedback on). Future research should further examine the role of such factors. Furthermore, future studies could expand on our research by examining the interaction between reflection and the direction of discrepancy in a more rigid fashion.

Lastly, starting from our findings on the effects of reflecting about single self-relevant experiences, future research should aim to gain a better understanding of long-term processes of reflection and self-concept change. One approach could, for example, be to expand on our research by examining reflection on not one but several instances of self-relevant experiences and by measuring subsequent reflection as well as self-concept change. Producing several such experiences in a controlled setting and assessing reflection as well as self-concept change over longer periods would help us understand conditions for sustainable changes in one's self-concept.

---

[32] Study 2 included a short measure of need for cognition (Beißert et al., 2014). In exploratory analyses that can be found on OSF, we found no significant correlation with self-reported reflection, but a negative main effect on self-concept change in a regression including both need for cognition and the reflection conditions, while the main effect of the reflection conditions remained significant.

Conclusion

While reflection on self-relevant experiences has been theorized to lead to self-concept change, there is little research examining their association. The present research provides correlational and experimental evidence that reflection is positively associated with self-concept change. We further find some evidence that this association might be more pronounced for reflection after negative than after positive feedback.

References

Baddeley, A. (1992). Working memory. *Science*, *255*(5044), 556–559. https://doi.org/10.1126/science.1736359

Bates, D., Mächler, M., Bolker, B. M., & Walker, S. C. (2015). Fitting linear mixed-effects models using lme4. *Journal of Statistical Software*, *67*(1), 1–48. https://doi.org/10.18637/jss.v067.i01

Beißert, H., Köhler, M., Rempel, M., & Beierlein, C. (2014). *Eine deutschsprachige Kurzskala zur Messung des Konstrukts Need for Cognition: Die Need for Cognition Kurzskala (NFCK)* (GESIS-Working Papers 2014/32). GESIS—Leibniz Institut für Sozialwissenschaften. https://nbn-resolving.org/urn:nbn:de:0168-ssoar-403157

Bennett, G. K., & Fry, D. E. (1969). Bennett mechanical comprehension test. *New York: Psychological Corporation*.

Berkowitz, M., Gerber, A., Thurn, C. M., Emo, B., Hoelscher, C., & Stern, E. (2020). *Novel spatial ability tests*. Retrieved from osf.io/jf5mx

Bleidorn, W., Hopwood, C. J., & Lucas, R. E. (2018). Life events and personality trait change. *Journal of Personality*, *86*(1), 83–96. https://doi.org/10.1111/jopy.12286

Bölte, S. (2005). *Reading the mind in the eyes test für Erwachsene (dt. Fassung) von S. Baron-Cohen.* Germany: J.W. Goethe-Universität Frankfurt/M.

Boyd, E. M., & Fales, A. W. (1983). Reflective learning: Key to learning from experience. *Journal of Humanistic Psychology*, *23*(2), 99–117. https://doi.org/10.1177/0022167883232011

Brandtstädter, J., & Greve, W. (1994). The aging self: Stabilizing and protective processes. *Developmental Review*, *14*(1), 52–80. https://doi.org/10.1006/drev.1994.1003

Brotzeller, F., & Gollwitzer, M. (2024). Exploring asymmetries in self-concept change after discrepant feedback. *Personality and Social Psychology Bulletin*, 01461672241232738. https://doi.org/10.1177/01461672241232738

Brotzeller, F., & Gollwitzer, M. (2025). *The role of demand effects in studying self-concept change after discrepant feedback*. Manuscript in preparation.

Campbell, J. D., Trapnell, P. D., Heine, S. J., Katz, I. M., Lavallee, L. F., & Lehman, D. R. (1996). Self-concept clarity: Measurement, personality correlates, and cultural boundaries. *Journal of Personality and Social Psychology*, *70*, 141–156. https://doi.org/10.1037/0022-3514.70.1.141

Carter, M. J., & Bruene, S. (2019). Examining the relationship between self-perceptions of person, role, and social identity change and self-concept clarity. *Imagination, Cognition and Personality*, *38*(4), 425–451. https://doi.org/10.1177/0276236618792267

Cengiz, C. (2020). The effect of structured journals on reflection levels: With or without question prompts? *Australian Journal of Teacher Education*, *45*(2), 23–43. https://doi.org/10.3316/ielapa.192236383097301

Chen, N.-S., Wei, C.-W., Wu, K.-T., & Uden, L. (2009). Effects of high level prompts and peer assessment on online learners' reflection levels. *Computers & Education*, *52*(2), 283–291. https://doi.org/10.1016/j.compedu.2008.08.007

Coles, N. A., Wyatt, M., & Frank, M. C. (2023). *A quantitative review of demand characteristics and their underlying mechanisms*. PsyArXiv. https://doi.org/10.31234/osf.io/uw85a

DeRue, D. S., Nahrgang, J. D., Hollenbeck, J. R., & Workman, K. (2012). A quasi-experimental study of after-event reviews and leadership development. *Journal of Applied Psychology*, *97*(5), 997–1015. https://doi.org/10.1037/a0028244

Dijkstra, K. A., & Hong, Y. (2019). The feeling of throwing good money after bad: The role of affective reaction in the sunk-cost fallacy. *PLoS ONE*, *14*(1), e0209900. https://doi.org/10.1371/journal.pone.0209900

Elder, J., Davis, T., & Hughes, B. L. (2022). Learning about the self: Motives for coherence and positivity constrain learning from self-relevant social feedback. *Psychological Science*, *33*(4), 629–647. https://doi.org/10.1177/09567976211045934

Faul, F., Erdfelder, E., Lang, A.-G., & Buchner, A. (2007). G*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods*, *39*(2), 175–191. https://doi.org/10.3758/BF03193146

Formann, A. K., Waldherr, K., & Piswanger, K. (2011). *Wiener Matrizen-Test 2: Ein Rasch-skaldierter sprachfreier Kurztest zu Erfassung der Intelligenz; WMT-2.* Beltz Test, Hogrefe.

Glück, J., & Weststrate, N. M. (2022). The wisdom researchers and the elephant: An integrative model of wise behavior. *Personality and Social Psychology Review*, *26*(4), 342–374. https://doi.org/10.1177/10888683221094650

Green, P., & MacLeod, C. J. (2016). SIMR: An R package for power analysis of generalized linear mixed models by simulation. *Methods in Ecology and Evolution*, *7*(4), 493–498. https://doi.org/10.1111/2041-210X.12504

Hakmiller, K. L. (1966). Threat as a determinant of downward comparison. *Journal of Experimental Social Psychology*, *1*, 32–39. https://doi.org/10.1016/0022-1031(66)90063-1

Heppner, P. P., & Petersen, C. H. (1982). The development and implications of a personal problem-solving inventory. *Journal of Counseling Psychology*, *29*(1), 66–75. https://doi.org/10.1037/0022-0167.29.1.66

Hitch, G. J., & Baddeley, A. D. (1976). Verbal reasoning and working memory. *Quarterly Journal of Experimental Psychology*, *28*(4), 603–621. https://doi.org/10.1080/14640747608400587

Hughes, J., & Beiner, D. (2021). *Reghelper: Helper functions for regression analysis. R package version 1.1.0.* https://CRAN.R-project.org/package=reghelper

Johnson, E. D., Tubau, E., & De Neys, W. (2014). The unbearable burden of executive load on cognitive reflection: A validation of dual process theory. *Proceedings of the Annual Meeting of the Cognitive Science Society*, *36*(36), 2441–2446.

Kersting, M., Althoff, K., & Jäger, A. O. (2008). *Wilde-Intelligenz-Test 2: WIT-2.* Göttingen: Hogrefe.

Kidder, D. P., Park, D. C., Hertzog, C., & Morrell, R. W. (1997). Prospective memory and aging: The effects of working memory and prospective memory task load. *Aging, Neuropsychology, and Cognition*, *4*(2), 93–112. https://doi.org/10.1080/13825589708256639

Kroneisen, M., Rummel, J., & Erdfelder, E. (2014). Working memory load eliminates the survival processing effect. *Memory*, *22*(1), 92–102. https://doi.org/10.1080/09658211.2013.815217

Lechermeier, J., & Fassnacht, M. (2018). How do performance feedback characteristics influence recipients' reactions? A state-of-the-art review on feedback source, timing, and valence effects. *Management Review Quarterly*, *68*(2), 145–193. https://doi.org/10.1007/s11301-018-0136-8

Leiner, D. (2021). *SoSci survey* (Version 3.2.29) [Computer software]. https://www.soscisurvey.de

McAdams, D. P., & McLean, K. C. (2013). Narrative identity. *Current Directions in Psychological Science*, *22*(3), 233–238. https://doi.org/10.1177/0963721413475622

Miller, J. P. (2020). Finding truth within: Exploring the importance of reflective practice in deepening self-knowledge. *Integral Review*, *16*(1), 357–390.

Morin, A. (2011). Self-awareness part 1: Definition, measures, effects, functions, and antecedents. *Social and Personality Psychology Compass*, *5*(10), 807–823. https://doi.org/10.1111/j.1751-9004.2011.00387.x

Müller-Pinzler, L., Czekalla, N., Mayer, A. V., Stolz, D. S., Gazzola, V., Keysers, C., Paulus, F. M., & Krach, S. (2019). Negativity-bias in forming beliefs about own abilities. *Scientific Reports*, *9*(1), 14416. https://doi.org/10.1038/s41598-019-50821-w

Overeem, K., Wollersheim, H., Driessen, E., Lombarts, K., Van De Ven, G., Grol, R., & Arah, O. (2009). Doctors' perceptions of why 360-degree feedback does (not) work: A qualitative study. *Medical Education*, *43*(9), 874–882. https://doi.org/10.1111/j.1365-2923.2009.03439.x

Pals, J. L. (2006). Narrative identity processing of difficult life experiences: Pathways of personality development and positive self-transformation in adulthood. *Journal of Personality*, *74*(4), 1079–1110. https://doi.org/10.1111/j.1467-6494.2006.00403.x

Pietzsch, M. C., & Pinquart, M. (2023). Predicting coping with expectation violations: Combining the ViolEx model and the covariation principle. *Frontiers in Psychology*, *14, 1152261*. https://doi.org/10.3389/fpsyg.2023.1152261

Pinquart, M., Rothers, A., Gollwitzer, M., Khosrowtaj, Z., Pietzsch, M., & Panitz, C. (2021). Predictors of coping with expectation violation: An integrative review. *Review of General Psychology*, *25*(3), 321–333. https://doi.org/10.1177/10892680211024123

Quintus, M., Egloff, B., & Wrzus, C. (2021). Daily life processes predict long-term development in explicit and implicit representations of Big Five traits: Testing predictions from the TESSERA (triggering situations, expectancies, states and state expressions, and reactions) framework. *Journal of Personality and Social Psychology*, *120*(4), 1049–1073. https://doi.org/10.1037/pspp0000361

R Core Team. (2023). R: A language and environment for statistical computing. R Foundation for Statistical Computing. *Http://Www.r-Project.Org/*.

Rakshasbhuvankar, A. (2021). Individual participant data (IPD) meta-analysis. In S. Patole (Ed.), *Principles and practice of systematic reviews and meta-analysis* (pp. 147–155). Springer International Publishing. https://doi.org/10.1007/978-3-030-71921-0_14

Raudenbush, S. W., & Bryk, A. S. (1985). Empirical Bayes meta-analysis. *Journal of Educational Statistics*, *10*(2), 75–98. https://doi.org/10.3102/10769986010002075

Rodriguez Añez, C. R., Reis, R. S., & Petroski, E. L. (2008). Brazilian version of a lifestyle questionnaire: Translation and validation for young adults. *Arquivos Brasileiros de Cardiologia*, *91*, 102–109. https://doi.org/10.1590/S0066-782X2008001400006

Rogers, R. R. (2001). Reflection in higher education: A concept analysis. *Innovative Higher Education*, *26*(1), 37–57. https://doi.org/10.1023/A:1010986404527

Sargeant, J. M., Mann, K. V., van der Vleuten, C. P., & Metsemakers, J. F. (2009). Reflection: A link between receiving and using assessment feedback. *Advances in Health Sciences Education*, *14*(3), 399–410. https://doi.org/10.1007/s10459-008-9124-4

Schriber, R. A., & Robins, R. W. (2012). Self-knowledge: An individual-differences perspective. In S. Vazire & T. D. Wilson (Eds.), *Handbook of self-knowledge* (pp. 105–127). The Guilford Press.

Sedikides, C., & Skowronski, J. J. (1995). On the sources of self-knowledge: The perceived primacy of self-reflection. *Journal of Social and Clinical Psychology*, *14*(3), 244–270. https://doi.org/10.1521/jscp.1995.14.3.244

Shavelson, R. J., Hubner, J. J., & Stanton, G. C. (1976). Self-concept: Validation of construct interpretations. *Review of Educational Research*, *46*(3), 407–441. https://doi.org/10.3102/00346543046003407

Shears, C., Miller, V., Ball, M., Hawkins, A., Griggs, J., & Varner, A. (2007). Cognitive demand differences in causal inferences: Characters' plans are more difficult to comprehend than physical causation. *Discourse Processes*, *43*(3), 255–278. https://doi.org/10.1080/01638530701226238

Tangney, J. P., & Tracy, J. L. (2012). Self-conscious emotions. In *Handbook of self and identity* (2nd ed., pp. 446–478). The Guilford Press.

Torchiano, M. (2020). *_effsize: Efficient effect size computation_*. https://doi.org/10.5281/zenodo.1480624

Trepte, S., & Verbeet, M. (2010). *Allgemeinbildung in Deutschland: Erkenntnisse aus dem SPIEGEL-Studentenpisa-Test*. Springer-Verlag.

Trepte, S., & Verbeet, M. (2021). *Spiegel-Studentenpisa-Test.* GESIS Datenarchiv, Köln. ZA6268 Datenfile Version 1.0.0. https://doi.org/10.4232/1.13780

Unkelbach, C., Alves, H., & Koch, A. (2020). Chapter Three - Negativity bias, positivity bias, and valence asymmetries: Explaining the differential processing of positive and negative information. In B. Gawronski (Ed.), *Advances in experimental social psychology* (Vol. 62, pp. 115–187). Academic Press. https://doi.org/10.1016/bs.aesp.2020.04.005

Wilson, D. M. C., Nielsen, E., & Ciliska, D. (1984). Lifestyle assessment: Testing the FANTASTIC instrument. *Canadian Family Physician*, *30*, 1863–1866.

Wrzus, C. (2021). Processes of personality development: An update of the TESSERA framework. In J. F. Rauthmann (Ed.), *The Handbook of Personality Dynamics and Processes* (pp. 101–123). Elsevier. https://doi.org/10.1016/B978-0-12-813995-0.00005-4

Wrzus, C., & Roberts, B. W. (2017). Processes of personality development in adulthood: The TESSERA framework. *Personality and Social Psychology Review*, *21*(3), 253–277. https://doi.org/10.1177/1088868316652279

7 Manuscript 3: The Role of Demand Effects in Studying Self-Concept Change After Discrepant Feedback

This manuscript is currently under review at a peer-reviewed journal.

The Role of Demand Effects in Studying Self-Concept Change after Discrepant Feedback

Franziska Brotzeller[a] & Mario Gollwitzer[a]

[a] Department of Psychology, Ludwig Maximilian University of Munich, Leopoldstraße 13, 80802 Munich, Germany

Author Note

Franziska Brotzeller https://orcid.org/0009-0002-3069-1503

Study materials, data sets, and analysis scripts are openly available at the project's Open Science Framework page (https://osf.io/nj594/?view_only=1938058f03904973957fc06a240094a8). Both studies reported in this manuscript were preregistered (see preregistrations at https://aspredicted.org/rct9-d6sh.pdf for Study 1 and https://aspredicted.org/nqj9-btp4.pdf for Study 2).

We would like to thank Elena Cadeggianini for her help in creating study materials and collecting data for Study 1. This research has been conducted without external funding.

Correspondence concerning this article should be addressed to Franziska Brotzeller, Department of Psychology, Ludwig-Maximilians-Universität München, Leopoldstraße 13, 80802 Munich, Germany. Email adresses: f.brotzeller@psy.lmu.de (F. Brotzeller), mario.gollwitzer@psy.lmu.de (M. Gollwitzer).

Word count: 9,318

Abstract

Research shows that people adapt their self-perceptions (i.e., self-concept) to self-relevant feedback they receive—especially when the feedback is discrepant from their initial self-concept. It is unclear, though, whether and to what extent such findings may result from demand characteristics and, thus, reflect methodological artifacts rather than actual changes in self-perceptions. To address this issue, we conducted two studies (total *N* = 957) in which we manipulated demand characteristics by varying which researcher hypothesis was communicated to participants. Results show that self-concept change resulting from feedback participants received was mostly unaffected by experimental variations in demand characteristics. Exploring the effect of participants' motivation to (dis)confirm the communicated hypothesis, we found that it impacted the effect of demand characteristics on self-concept change only under very specific conditions. All in all, our findings do not support the assumption that findings on self-concept change after discrepant feedback merely result from demand effects.

Keywords: self-concept, self-concept change, demand characteristics, demand effects

The Role of Demand Effects in Studying Self-Concept Change after Discrepant Feedback

Demand effects are not yet well understood. They occur when certain cues make participants aware of the research hypothesis and when this subsequently impacts their responses (Coles, Gaertner, et al., 2023; Orne, 1962). Needless to say, demand effects pose a risk to the validity of scientific results—they are methodological artifacts rather than substantive effects. This is why many studies in which demand effects may potentially play a role—such as when participants may be able to guess the research hypothesis—take great care to alleviate the risk of demand effects to occur, for instance by using cover stories (e.g., Olson & Raz, 2021), non-transparent measures (e.g., Bender et al., 2013), or a careful debriefing (Page, 1973), which can be used to flag participants who had correctly guessed the hypothesis and responded in a hypothesis-consistent manner (*good subjects*; Orne, 1962).

In this paper, we discuss the potential danger of demand effects in a specific field of research: self-concept change after receiving feedback. The self-concept is defined as all self-perceptions a person holds (Shavelson et al., 1976). A better understanding of feedback-induced changes in such self-perceptions is important, for example, for understanding how self-perceptions develop over the lifespan, for developing effective therapeutic or coaching techniques, or for determining how feedback should be given in an organizational context. However, research studying self-concept change after discrepant feedback often uses designs that might be susceptible to demand effects: Often, participants are asked to indicate their self-perceptions regarding one or more specific domains of the self-concept, then they receive feedback regarding those domains, and are then asked to indicate their self-perceptions again (e.g., Bosch & Wilbert, 2023; Brotzeller & Gollwitzer, 2024; Korn et al., 2014). One "demand characteristic" in such a design is the repeated measurement of self-perceptions: When answering a question like "How good do you think you are at X?" before and after receiving feedback regarding the respective domain, participants may guess that the research hypothesis to be tested in this study is whether the feedback they received will change their self-perceptions. Such a guess may

then impact their response and render it invalid.

Self-Concept Change after Discrepant Feedback

Confronting people with external information about themselves that deviates from how they see themselves can lead to changes in their self-concept (Markus & Wurf, 1987). One assumed mechanism behind this is that receiving such discrepant feedback can lead people to reflect on, question, and then recalibrate their self-concept (Brotzeller et al., 2025; Wrzus & Roberts, 2017). Since the 1960s, a myriad of studies has investigated whether and under which conditions feedback leads to self-concept change (e.g., Bergin, 1962; Binderman et al., 1972; Bosch & Wilbert, 2023; Brotzeller & Gollwitzer, 2024; Korn et al., 2012; Kube et al., 2022). Such effects have been studied in different contexts, for instance in an intercultural context (Korn et al., 2014), in a clinical setting (e.g., regarding social anxiety, depressive symptoms, or borderline personality disorder; Koban et al., 2017; Korn et al., 2016; Kube, Glombiewski, et al., 2019; Kube, Rief, et al., 2019; Kube & Glombiewski, 2021), or in other applied contexts (e.g., creativity and creative self-efficacy; Tao et al., 2025).

While those research projects examined different research questions within the broader field of self-concept change, all of them used a design in which participants were asked to indicate their self-perceptions before and after receiving self-relevant feedback. The exact configuration of the study design and procedure differs between studies: Some, for example, studied the effects of one-shot feedback (e.g., Kube et al., 2022); others gave feedback and measured participants' self-concepts multiple times during the same experimental session (e.g., Müller-Pinzler et al., 2019). Some focused on one domain of the self-concept (e.g., Bosch & Wilbert, 2023; Müller-Pinzler et al., 2019), while others studied self-concept change after discrepant feedback regarding several self-concept domains during the same study (e.g., Elder et al., 2022; Korn et al., 2012, 2014). Despite these and other differences, the underlying assumption in all studies is that changes in self-perceptions before and after receiving feedback indicate true self-concept change.

The Potential Role of Demand Effects

There is, however, an alternative explanation: The observed changes in self-perceptions might not necessarily indicate "true" feedback-induced self-concept change; instead, they might result from a methodological artifact driven by cues that make participants aware of the researcher hypothesis (i.e., demand characteristics; Coles, Gaertner, et al., 2023). In studies on self-concept change after feedback, the repeated measurement of participants' self-perceptions before and after receiving feedback might be such a cue. This is in line with Orne's (1962) early works on the topic, who stated that "if a test is given twice with some intervening treatment, even the dullest college student is aware that some change is expected, particularly if the test is in some obvious way related to the treatment" (p. 779). Wanting to comply with the assumed researcher hypothesis, participants might then adapt their responses in line with the hypothesis—a demand effect (also known as the good subject effect; Nichols & Maner, 2008a; Orne, 1962).

The potential risk of such designs producing demand characteristics was discussed in some papers studying self-concept change after discrepant feedback (e.g., Brotzeller et al., 2025; Tao et al., 2025). Furthermore, some authors used cover stories, communicating a different research purpose to counter potential demand characteristics created by the study design (Kube et al., 2022; Kube, Glombiewski, et al., 2019; Kube, Rief, et al., 2019; Kube & Glombiewski, 2021; Tao et al., 2025). Testing the applicability of a diagnostic procedure for clinical diagnostic use, for example, served as the cover story in two studies (Kube, Glombiewski, et al., 2019; Kube, Rief, et al., 2019). The results from the studies employing cover stories vary, from no to large significant effects for the examined changes in the self-concept before and after the feedback. And while a cover story can be one way of countering demands characteristics (Corneille & Lush, 2023; Olson & Raz, 2021), it is unclear whether the cover stories employed in these studies were successful in doing so. Thus, we cannot say whether changes found in these and other studies stem from methodological artifacts rather than actual changes in self-

perceptions. The first goal of the present research therefore is to investigate whether changes in the self-concept found after discrepant feedback result from demand characteristics.

Furthermore, we aim to examine demand effects regarding one more specific effect in the context of self-concept change after discrepant feedback: the effect of the size of discrepancy between the feedback and the initial self-concept on self-concept change. Several studies have found that larger discrepancies produce more self-concept change than smaller or no discrepancies between feedback and initial self-concept (Brotzeller & Gollwitzer, 2024; Kube, Rief, et al., 2019; Swann & Hill, 1982). However, such effects might be especially susceptible to demand effects: When asking twice about self-perceptions, receiving discrepant feedback might create the expectation that there should be some kind of change in those self-perceptions, but receiving *highly* discrepant feedback might produce even stronger expectations for change. The second goal of the present research therefore is to examine whether the effect of the size of discrepancy on self-concept change after discrepant feedback results from demand characteristics.

Importantly, perceiving demand characteristics can produce several types of responses in participants: They might acquiesce (i.e., provide hypothesis-confirming responses; also referred to as *good subjects*), counter-acquiesce (i.e., provide hypothesis-disconfirming responses; also referred to as *bad subjects* or *negativistic subjects*), or non-acquiesce (i.e., not change their responses; also referred to as *faithful subjects*; Orne, 1962; Rosnow & Aiken, 1973; Weber & Cook, 1972). Depending on how participants react, demand characteristics might therefore produce different patterns of results. Research has shown that, on average, participants respond in a way that confirms the hypothesis, although there can be considerable variability in their responses depending on the participant and the study (Coles, Wyatt, et al., 2023; Nichols & Maner, 2008). In our research, participants' motivation to (dis)confirm the researcher hypothesis will therefore be taken into account.

The Present Research

We present two studies investigating whether and how demand characteristics impact self-concept change after discrepant feedback. In both studies, we built upon the typical design used in self-concept change research: We asked participants to indicate their self-perception regarding a specific domain of the self-concept and to then complete a task measuring this domain. After giving them feedback on their task results, we again asked participants to indicate their self-perception. Our design deviated from previous studies in one important way: We experimentally manipulated demand characteristics by communicating a researcher hypothesis to participants at the beginning of each study. More specifically, we manipulated whether the researchers ostensibly "expected" to find self-concept change after discrepant feedback or not in Study 1, while we manipulated whether the researchers expected such change to depend on the size of the discrepancy between feedback and initial self-concept in Study 2. This approach enabled us to study potential demand effects in a conservative way: If self-concept change after discrepant feedback indeed resulted from demand characteristics and participants are, on average, behaving like good subjects, then we should not find any change in a condition suggesting that no change is expected. However, to account for different responses to demand characteristics, we also measured participants' motivation to (dis)confirm and explored whether this impacted our effects of interest. Both studies were conducted online on *SoSciSurvey* (Leiner, 2021) and in German.

Transparency and Openness

Data, R codes for primary analyses, and supplemental materials are available online at https://osf.io/nj594/?view_only=1938058f03904973957fc06a240094a8 for all studies. We report how we determined our sample size, all data exclusions, all manipulations, and all measures for all studies (Simmons et al., 2012). Preregistrations can be found at https://aspredicted.org/rct9-d6sh.pdf for Study 1 and https://aspredicted.org/nqj9-btp4.pdf for Study 2. These preregistrations detail the study designs,

pre-planned stopping rules, and exclusion criteria as well as the research questions or hypotheses. The data from Study 1 were used in a previous publication investigating a different research question (Brotzeller et al., 2025).

Study 1

The first goal of the present research was to investigate whether self-concept change after discrepant feedback may be impacted by demands characteristics. To do so, we experimentally manipulated whether participants were told that the researchers expected to find self-concept change after discrepant feedback (positive-hypothesis), whether they expected not to find self-concept change after discrepant feedback (nil-hypothesis), or whether participants were not told anything about the research hypothesis (no-hypothesis). We measured self-perceptions before and after giving participants feedback on a task and analyzed intraindividual changes in these self-perceptions.

Method

Procedure

After giving informed consent and providing basic demographic information, all participants were told that, in the following, they would be asked to rate their own ability for estimating the weight of objects and living beings. They were further told that, subsequently, they would work on a task measuring their ability for weight estimation and receive feedback on their task performance. Participants were then randomly assigned to one of three demand conditions. In all three conditions, they were told: “We are interested in your response to the feedback.” Participants in the *no-hypothesis* condition then moved on to indicating their self-perceptions. Participants in the *positive-hypothesis* and the *nil-hypothesis* conditions further read the following text (deviations in the nil-hypothesis condition displayed in brackets): “Among other things, this study is intended to test the assumption that people [do not] adapt their self-perception to the feedback [even] if it differs from their original self-perception.”

All participants were asked to indicate their self-perception regarding their ability for weight estimation. Afterwards, they worked on a self-created weight estimation task with 12 subtasks. In each subtask, participants saw the name and a photo of an object or living being, along with four options for what this object or living being might weigh. Participants were asked to choose the correct option. After completing all subtasks, participants received feedback on their performance in the task (i.e., the percentage of correctly solved subtasks). The feedback reflected participants' actual performance. An exemplary feedback read: "Your answers on the estimation test have been evaluated. On a scale from 0% (very bad estimation ability) to 100% (very good estimation ability) you are at: 75%". Then, participants were again asked to indicate their self-perception regarding their ability for weight estimation. Afterwards, participants completed several further measures. Among those measures was a manipulation check regarding participants' assumption of the researcher hypothesis. Those who indicated having perceived a researcher hypothesis were furthermore asked whether this impacted how they responded during the study. Furthermore, participants responded to three attention check items (one instructed response attention check and two items asking participants to recall their initial self-rating as well as the feedback they received) and indicated whether or not they had attentively completed the survey ("use me" item; see Meade & Craig, 2012).[33] Finally, participants were thanked for their participation and debriefed.

Measures

Self-Concept Change. Participants' self-perceptions were assessed at two occasions using the same item on a scale from 0% = *very bad* to 100% = *very good*. The item read "How good do you think you are at estimating the weight of objects or living beings?" (M_{t1} = 46.21, SD_{t1} = 21.09; M_{t2} = 33.64, SD_{t2}

[33] Participants responded to some additional measures that are not central to the present research and will therefore not be further discussed. The full materials for this study are available on OSF.

= 17.73). For the self-concept change score, we subtracted self-perceptions at t1 from self-perceptions at t2. As we were interested in the amount rather than the direction of change, we created absolute values of this score, which resulted in the final absolute self-concept change score used in our analyses (*M* = 15.41, *SD* = 14.39).

Assumed Researcher Hypothesis. To check whether our demand manipulation was successful, we asked participants about their assumption about which hypothesis the researchers had. More specifically, we asked: "In your opinion: What is the researchers' expectation regarding the extent to which people adjust their self-perception after receiving discrepant feedback?" Participants could choose one of three response options: "The researchers expect that people adjust their self-perception after discrepant feedback" (i.e., positive-hypothesis assumption); "The researchers expect that people do not adjust their self-perception after discrepant feedback;" (i.e., nil-hypothesis assumption); or "The researchers have no expectation regarding this" (i.e., no-hypothesis assumption).

Motivation to (Dis)Confirm. Participants who had *not* selected the option "The researchers have no expectation regarding this" were asked whether and how the (assumed) researcher hypothesis may have affected their responses to the questions in the study. More specifically, participants could choose one of three response options: "No, it [i.e., the expectation I perceived the researchers to have] didn't affect me: I answered the way I would have answered if I hadn't noticed the expectation;" "Yes, it affected me: I (tended to) answer in a way that confirmed the expectation;" or "Yes, it affected me: I (tended to) answer in a way that disconfirmed the expectation".

Sample

Participants were recruited through university and other mailing lists as well as personal networks. The only eligibility criterion was a minimum age of 18 years. In return for participating, participants could take part in a raffle for vouchers or receive course credit. Within the preregistered time frame, we collected data from 667 participants. After applying the preregistered exclusion criteria,

we excluded data from 75 participants. More specifically, 32 participants were excluded because they did not correctly respond to both of the feedback and self-rating attention checks, 24 further participants were excluded for failing our instructed response attention check, 7 were excluded because the feedback was not discrepant from their initial self-rating, and 12 were excluded because they indicated that they did not complete the survey attentively (Meade & Craig, 2012). The final sample thus comprised N = 592 participants (M_{age} = 31.05, SD_{age} = 14.49; 412 female, 170 male, 10 "other"). A sensitivity power analysis conducted in G*Power (α = .05, 1-β = .80, total sample size = 592, number of groups = 3; Faul et al., 2007) indicated that we could detect an effect of η^2 = 0.02 for our main analysis with this sample.

Results

We used R to conduct all analyses in both studies (R Core Team, 2023).

Manipulation Check

To test whether our manipulation was successful, we conducted a chi-square test of independence testing the null hypothesis that the demand manipulation and the assumed researcher hypothesis are independent of each other. The H_0 was rejected, χ^2 (4, N = 592) = 20.05, p < .001, Cramer's V = .12, 95% CI for Cramer's V [.01, .17]. Next, we computed Standardized Pearson Residuals (SPR), which, along with the observed and expected frequencies under the H_0, are displayed in Table 1. SPR > 2 indicate that the observed frequency in the respective cell differs significantly from the expected frequency, suggesting that the cell contributes to the association between the two variables (Agresti, 2002). As can be seen from the SPR values in Table 1, participants in the *positive-hypothesis* condition were more likely to assume that the researchers' hypothesis was that feedback *does* have an effect on self-concept change. Participants in the *nil-hypothesis* condition were more likely to assume that the researchers' hypothesis was that feedback *does not* have an effect on self-concept change (and they were less likely to have a positive-hypothesis assumption). Participants in the *no-hypothesis* condition

were less likely to assume that the researchers' hypothesis was that feedback does not have an effect on self-concept change, but they were not more likely to assume that the researchers had no hypothesis at all.

Table 7.1

Observed and Estimated Expected Frequencies as well as Standardized Pearson Residuals for Demand Condition and Assumed Researcher Hypothesis

	Assumed Researcher Hypothesis			
Demand Condition	Positive	Nil	No	Total
Positive-hypothesis				
N	162	31	6	199
Estimated under H_0	149.92	39.33	9.75	
SPR	2.44*	-1.82	-1.51	
Nil-hypothesis				
N	133	58	9	200
Estimated under H_0	150.68	39.53	9.80	
SPR	-3.56*	4.03*	-0.32	
No-hypothesis				
N	151	28	14	193
Estimated under H_0	145.40	38.14	9.45	
SPR	1.14	-2.23*	1.85	
Total	446	117	29	592

Note. SPR = Standardized Pearson Residual. Values > 2 are marked with *

The results of our manipulation check indicate that, by and large, our manipulation impacted participants' assumptions of the researcher hypothesis in the expected direction. However, observed frequencies show that in all conditions, most participants assumed that the researchers' hypothesis was that feedback *does* have an effect on self-concept change. When conducting analyses with the experimental demand manipulation as a predictor, we therefore always indicate whether the results match those obtained when using the manipulation check instead of the experimental manipulation as the predictor.

Main Analysis

For our main analysis, we examined whether self-concept change differed between the three demand conditions. Descriptively, self-concept change was lowest in the positive-hypothesis condition (M = 14.12, SD = 13.67), followed by the nil-hypothesis condition (M = 15.54, SD = 14.73), and the no-hypothesis condition (M = 16.61, SD = 14.71), but these differences were not statistically significant, $F(2,589) = 1.48$, $p = .228$, $\eta^2 = .01$, 95% CI [.00, .02].[34]

Exploratory Analyses

Next, we wanted to explore whether participants' motivation to (dis)confirm the hypothesis impacted their amount of self-concept change after being told that the researchers expected versus did not expect to find such change. To do so, we created a continuous variable for the motivation to (dis)confirm: Participants who indicated having responded in a way that disconfirmed the (assumed) hypothesis were coded as -1; those who indicated not being affected were coded as 0; and those who indicated having responded in a way that confirmed the (assumed) hypothesis were coded as 1 (among respondents, options were chosen with a frequency of 5%, 85%, and 10%, respectively). Participants

[34] These results match those obtained when conducting the analysis with the assumed researcher hypothesis instead of the experimental conditions as the predictor.

who assumed that the researchers did not have any hypothesis in the first place were excluded from the analysis as they had not indicated a motivation to (dis)confirm (n = 29). Furthermore, n = 179 participants from the no-hypothesis condition were excluded as we were interested in comparing the two conditions in which a research hypothesis had been communicated. The remaining demand condition-variable was dummy-coded (i.e., nil-hypothesis = 0, positive-hypothesis = 1).

To investigate whether the motivation to dis(confirm) moderated the effect of the remaining two demand conditions on self-concept change, we entered the dummy-coded demand conditions, the motivation to (dis)confirm (standardized on the sample mean and standard deviation), and their interaction into a linear regression predicting absolute self-concept change. Overall, the model did not explain a significant amount of variance in self-concept change, $F(3,380) = 1.76$, $p = .155$, $R^2 = .01$, 95% CI for R^2 [.00, .01]. The interaction between the demand conditions and the motivation to (dis)confirm did not significantly affect self-concept change, $B = 1.01$, $t(380) = 0.70$, $p = .484$, $sr^2 = .00$, 95% CI for B [-1.83, 3.85]. There was neither a main effect of the demand conditions, $B = -1.70$, $t(380) = -1.18$, $p = .237$, $sr^2 =$ 00, 95% CI for B [-4.52, 1.12], nor of the motivation to (dis)confirm, $B = 0.84$, $t(380) = 0.80$, $p = .427$, $sr^2 =$ 00, 95% CI for B [-1.24, 2.93].[35]

We conducted one further exploratory analysis. While our manipulation in Study 1 focused on whether the researchers expected to find self-concept change after feedback and did not mention the potential role of the size of discrepancy, we nevertheless wanted to explore whether the demand manipulation impacted the effect of the size of discrepancy on self-concept change. To do so, we created the size of discrepancy scores by subtracting participants' self-perception at t1 from their task feedback and creating absolute values of this variable (M = 24.94, SD = 17.39). For the analysis, we again

[35] Again, these results match the ones resulting from an analysis conducted with the assumed researcher hypothesis instead of the experimental conditions as the predictor.

used a reduced data set including only participants from the positive- and nil-hypothesis conditions. We conducted a linear regression analysis with the demand conditions (dummy-coded: nil-hypothesis = 0, positive-hypothesis = 1), the size of discrepancy (standardized on the sample mean and standard deviation), and their interaction predicting absolute self-concept change. The model explained a significant amount of variance in self-concept change, $F(3,395) = 85.46$, $p < .001$, $R^2 = .39$, 95% CI for R^2 [.32, .45]. There was a main effect of the size of discrepancy, $B = 10.54$, $t(395) = 12.77$, $p < .001$, $sr^2 = 25$, 95% CI for B [8.92, 12.16], but not of the demand conditions, $B = -1.64$, $t(395) = -1.47$, $p = .142$, $sr^2 = 00$, 95% CI for B [-3.82, 0.55]. The interaction between the demand conditions and the size of discrepancy significantly predicted self-concept change, $B = -3.32$, $t(395) = -2.97$, $p = .003$, $sr^2 = .01$, 95% CI for B [-5.52, -1.12].[36] Subsequent simple slopes analyses using the interactions-package (Long, 2019) unexpectedly revealed that while the size of discrepancy was significantly related to self-concept change in both conditions, this effect was stronger in the nil-hypothesis condition, $B = 10.54$, $p < .001$, than in the positive-hypothesis condition, $B = 7.22$, $p < .001$.

Discussion

Our results do not indicate that feedback-induced self-concept change is merely a product of demand characteristics: We found no difference in self-concept change between the demand conditions and participants' motivation to (dis)confirm did not impact this relationship. However, exploring whether the demand conditions impact the effect of the size of discrepancy on self-concept change, we found a small but significant interaction effect. The pattern of this interaction effect was unexpected in that the relationship between the size of discrepancy and self-concept change was less pronounced for participants who were told that the researchers expected to find self-concept change after feedback

[36] Patterns and significances of results stay the same when conducting the analysis with the assumed researcher hypothesis instead of the experimental conditions as the predictor.

than for those who were told that no change was expected. It is possible that this pattern resulted from participants wanting to disconfirm the respective hypothesis. Yet, given that the size of this interaction effect was so small (i.e., sr^2 = .01), we are hesitant to overclaim its practical and conceptual significance.

Notably, we only manipulated whether the researchers expected to find *any* feedback-related self-concept change, but we did not specify what exactly that change might look like. In other words, our manipulation did not directly target the effect of the size of discrepancy on self-concept change. Doing so was therefore one aim of Study 2. We furthermore wanted to increase the salience of our manipulation. Even though the experimental manipulation used in Study 1 impacted participants' perception of the researcher hypothesis, the majority of participants assumed that the researchers expected to find self-concept change after discrepant feedback across conditions. It is possible that the manipulation was not salient enough to sway the perception of the majority of participants. While conducting our analyses with the perceived instead of the manipulated research hypothesis did not produce any significant effects either, it is possible that a more salient experimental manipulation might have produced stronger effects on the assumed researcher hypothesis and subsequent self-concept change.

Study 2

The main aim of Study 2 was to further investigate whether the effect of the size of discrepancy on self-concept change results from demand characteristics. We used a similar design to Study 1 but adapted the experimental demand manipulation. It now comprised of two conditions in which we communicated to participants whether the researchers expected more self-concept change the larger the discrepancy between feedback and initial self-concept (positive-hypothesis condition) or whether they did not expect the discrepancy to matter (nil-hypothesis condition). We expected (and preregistered) a significant, positive main effect of size of discrepancy on self-concept change (H1). We furthermore expected this effect to be moderated by the demand conditions so that the association

between the size of discrepancy and self-concept change would be more pronounced in the positive-hypothesis condition than in the nil-hypothesis condition (H2). We nevertheless expected the association between the size of discrepancy and self-concept change to remain significant (albeit smaller) in the nil-hypothesis condition. As it was not relevant to our hypotheses, we omitted the control ("no-hypothesis") condition in Study 2.

Method

Procedure

Directly after providing informed consent and basic demographic information, participants were randomly assigned to one of the two demand conditions. In the positive-hypothesis condition, participants read:

> Does feedback influence how people perceive themselves (e.g. with regard to their characteristics or abilities)? We think: Yes, it does – and the greater the deviation from their self-perception, the more they adjust their self-perception.
>
> We arrive at this assumption because various psychological theories assume that self-perceptions are unstable, i.e. can change easily. We are conducting this study to find scientific evidence to support our assumption that people adjust their self-perception in response to feedback, with larger adjustments the more it deviates from the self-perception.

Participants in the nil-hypothesis condition read:

> Does feedback influence how people perceive themselves (e.g. with regard to their characteristics or abilities)? We think: No, it doesn't – regardless of how much the feedback deviates from the person's self-perception.
>
> We arrive at this assumption because various psychological theories assume that self-perceptions are stable, i.e. can hardly change. We are conducting this study to find scientific evidence to support our assumption that people do not adjust their self-perception in response

to feedback, no matter how much it deviates from the self-perception.

Afterwards, participants were informed that they would subsequently be asked for their self-perception regarding one ability, to work on a task measuring this ability, and to receive feedback on their task results. They were further told that the ability studied in this study was visual memory and received an explanation of what "visual memory ability" means exactly. They were then asked to rate their own visual memory abilities. Afterwards, participants completed a visual memory task: They were first shown a photo for 45 seconds and asked to memorize as many details as they could within the given timeframe. After the time was over, they were asked a total of 13 questions on the people, objects, and scenery displayed in the photo. For each question, they were presented with six response options and had to choose the correct one. Once they had responded to all questions, participants received feedback on the percentage of questions they had solved correctly. Like in Study 1, the feedback reflected participants' actual performance. An exemplary feedback read: "Your answers have been evaluated. On a scale from 0% (very low visual memory) to 100% (very high visual memory), you are at: 85%". Participants were then asked to again rate their own visual memory abilities and complete several other measures, among them a manipulation check and an assessment of their motivation to (dis)confirm the researcher hypothesis. Finally, participants responded to the same three attention check items as in Study 1 and one "use-me" item before being thanked for their participation and debriefed.[37]

Measures

Self-Concept Change. Like in Study 1, participants' self-perceptions were measured using one item each at two occasions. Both times, participants were asked to rate their own visual memory

[37] Study 2 contained some additional measures that are not central to the present research question and will not be discussed further. The full materials are available on OSF.

abilities on a response scale from 0% = *very low visual memory* to 100% = *very high visual memory* (M_{t1} = 58.89, SD_{t1} = 17.72; M_{t2} = 64.67, SD_{t2} = 15.31). Again, we were interested in the amount rather than the direction of self-concept change. Thus, the absolute self-concept change score was again created by calculating absolute values of the difference between self-perceptions at t1 and t2 (*M* = 9.27, *SD* = 9.08).

Assumed Researcher Hypothesis. To check whether our manipulation was successful, we again asked participants about their assumptions about the researchers' hypothesis. To gain a more detailed understanding of participants' assumptions, we asked them to indicate their agreement with two statements on a 6-point scale from 1 = *strongly disagree* to 6 = *strongly agree*. Participants were told that the statements were "about what the researchers expect regarding the effect of feedback on people's self-perceptions". The two statements were: "The researchers assume that it makes no difference how much the feedback deviates from the self-perception" (reverse-coded), "The researchers expect that people adjust their self-perception more the more the feedback deviates from the self-perception." Responses were aggregated across these two items (*M* = 4.06, *SD* = 1.76; *r* = .76, *p* < .001).

Motivation to (Dis)Confirm. Like in Study 1, we were interested in the extent to which participants are motivated to confirm or disconfirm the researcher hypothesis. We used a continuous measure adapted from Coles, Wyatt et al. (2023). Participants were reminded of the researcher hypothesis communicated at the beginning of the study and then asked to indicate their motivation to (dis)confirm it on one item: "To what extent were you motivated to adjust your answers based on the researchers' given hypothesis when working on this study? I wanted to respond in such a way that the researchers' expectation..." The 7-point response scale ranged from -3 = *is disconfirmed* to 3 = *is confirmed* (*M* = 0.21, *SD* = 0.93).

Sample

Participants were recruited through university mailing lists. Again, the only eligibility criterion was a minimum age of 18 years and participants could take part in a raffle for vouchers or receive

course credit in return for their participation. Data was collected until the date specified in our preregistration, resulting in 402 data sets. Applying the preregistered exclusion criteria led to the exclusion of 37 participants. Specifically, 20 participants were excluded because they incorrectly responded to at least one of the feedback and self-rating attention checks, 11 further participants were excluded because they failed the instructed response attention check, 3 were excluded because their feedback did not differ from their initial self-rating, and 3 further were excluded after indicating that they did not complete the survey attentively (Meade & Craig, 2012). This resulted in a final sample of N = 365 participants (M_{age} = 38.90 years, SD_{age} = 16.86 years; 276 female, 86 male, 3 "other"). We conducted a sensitivity power analysis in G*Power for H2 and H3 (α = .05, 1-β = .80, sample size = 365, number of tested predictors = 2, total number of predictors = 3; Faul et al., 2007). The analysis indicated that we could detect effects as small as sr^2 = 0.03 with our sample.

Results

Manipulation Check

To determine whether our experimental manipulation was successful, we compared mean assumptions of the researcher hypothesis in the two experimental conditions using a Welch's two-sample *t*-test. We found that means in the positive-hypothesis condition (M = 5.21, SD = 0.75) were significantly higher than those in the nil-hypothesis condition (M = 2.86, SD = 1.72), $t(239.56) = -16.81$, $p < .001$, d = -1.79, 95% CI for d [-2.03, -1.55] (effsize package; Torchiano, 2020), indicating that our experimental manipulation worked as intended.

Main Analysis

In preparation for our analyses, we created the size of discrepancy scores using the same approach as in Study 1 (M = 20.84, SD = 15.97). We then standardized size of discrepancy values on the sample mean and standard deviation. Furthermore, we dummy-coded the demand condition-variable (i.e., nil-hypothesis = 0, positive-hypothesis = 1).

To test whether the size of discrepancy was significantly related to self-concept change (H1), we conducted a linear regression analysis with standardized size of discrepancy predicting absolute self-concept change. The model explained a significant amount of variance in self-concept change, $F(1,363) = 179.80$, $p < .001$, $R^2 = .33$, 95% CI for R^2 [.26, .40]. The main effect of size of discrepancy was significant and positive, $B = 5.22$, $t(365) = 13.41$, $p < .001$, $sr^2 = .33$, 95% CI for B [4.46, 5.99], providing support for H1.

To test whether the effect of the size of discrepancy was moderated by the demand conditions (H2) and whether the effect of the size of discrepancy remained significant in the nil-hypothesis condition (H3), we conducted an additional linear regression analysis with standardized size of discrepancy as well as the dummy-coded demand conditions and their interaction as predictors of absolute self-concept change. Overall, the model explained a significant amount of variance in self-concept change, $F(3,361) = 59.73$, $p < .001$, $R^2 = .33$, 95% CI for R^2 [.25, .40]. The interaction between size of discrepancy and the demand conditions was not significant, $B = 0.28$, $t(361) = 0.36$, $p = .717$, $sr^2 = .00$, 95% CI for B [-1.25, 1.82]. This indicates that the association between the size of discrepancy and self-concept change did not significantly differ between the demand conditions, leading to the rejection of H2. The main effect of size of discrepancy was significant and positive, $B = 5.09$, $t(361) = 9.31$, $p < .001$, $sr^2 = .16$, 95% CI for B [4.01, 6.16]. This indicates that in the nil-hypothesis condition as the reference category in the regression model, larger discrepancies were associated with more self-concept change, supporting H3. The main effect of the demand conditions was not significant, $B = -0.28$, $t(361) = -0.35$, $p = .724$, $sr^2 = .00$, 95% CI for B [-1.81, 1.26].

Exploratory Analyses

Like in Study 1, we explored whether participants' motivation to (dis)confirm impacted the effects of interest in Study 2. Specifically, we were interested in the three-way interaction between the size of discrepancy, the demand conditions, and the motivation to (dis)confirm. If participants'

motivation to confirm or disconfirm the hypothesis indeed impacted how they responded to the demand conditions, we would expect the following pattern: For participants in the positive-hypothesis condition who want to confirm the researcher hypothesis, self-concept changes should be positively correlated with the size of discrepancy, while for those in the positive-hypothesis condition who want to disconfirm the researcher hypothesis, self-concept changes should be not or even negatively correlated with the size of discrepancy. For participants in the nil-hypothesis condition, we would expect the opposite pattern.

In preparation for our analysis, the motivation to (dis)confirm variable was standardized on the sample mean and standard deviation. To conduct our analysis, we entered the standardized size of discrepancy, the dummy-coded demand conditions, and the standardized motivation to (dis)confirm into a regression model predicting absolute self-concept change. The model explained a significant amount of variance in self-concept change, $F(7,357) = 26.55$, $p < .001$, $R^2 = .34$, 95% CI for R^2 [.26, .40]. The three-way interaction between size of discrepancy, the demand conditions, and the motivation to (dis)confirm was not significant, $B = 1.26$, $t(357) = 1.29$, $p = .200$, $sr^2 = .00$, 95% CI for B [-0.67, 3.19]. Furthermore, the main effect of size of discrepancy remained significant, $B = 4.99$, $t(357) = 9.07$, $p < .001$, $sr^2 = .15$, 95% CI for B [3.91, 6.07]. There was only one other significant effect: the two-way interaction between the demand conditions and the motivation to (dis)confirm, $B = 1.83$, $t(357) = 2.21$, $p = .028$, $sr^2 = .01$, 95% CI for B [0.20, 3.45]. A subsequent Johnson-Neyman interval analysis using the interactions-package (Long, 2019) revealed that for participants very strongly wanting to confirm the hypothesis (motivation to (dis)confirm > 2.48 *SD* above the sample mean), there was significantly more self-concept change in the positive-hypothesis condition than in the nil-hypothesis condition. For participants strongly wanting to disconfirm the hypothesis (motivation to (dis)confirm < -1.34 *SD* below the sample mean), there was significantly less self-concept change in the positive-hypothesis condition

than in the nil-hypothesis condition.[38] However, these results should be interpreted with caution as few participants chose response options at the extreme ends of the motivation to (dis)confirm scale.

Discussion

Study 2 provides evidence for the notion that the association between the size of discrepancy and self-concept change is not merely a function of demand characteristics. In contrast to our results from Study 1, we found that irrespective of the researcher hypothesis disclosed to participants at the beginning of the study, larger discrepancies were associated with more self-concept change. Furthermore, this pattern of results was not impacted by whether participants wanted to confirm or disconfirm the hypothesis. We did, however, find some evidence that participants' motivation to confirm or disconfirm can impact how they respond to demands characteristics: A significant (yet very small) interaction effect between the demand conditions and the motivation to (dis)confirm indicated that a very strong motivation to confirm or disconfirm the hypothesis can impact the amount of self-concept change after receiving discrepant feedback.

General Discussion

In the present research, we aimed to investigate whether self-concept change after discrepant feedback is produced by demand characteristics. We furthermore wanted to examine whether the effect of the size of discrepancy on self-concept change results from demand characteristics. In Study 1, we did not find that self-concept change differed depending on which researcher hypothesis was communicated at the beginning of the study, regardless of whether participants were motivated to confirm or disconfirm the hypothesis. Our results did, however, indicate that demand characteristics might impact the effect of the size of discrepancy on self-concept change, although this effect was very

[38] The full results for this analysis can be found on OSF.

small and in the opposite than the expected direction. However, as our manipulation did not directly target the effect of the size of discrepancy on self-concept change and instead focused on whether the researchers expected to find any change after feedback or not, it is unclear how to interpret this finding. We thus adapted our manipulation in Study 2 and were not able to replicate this particular finding: In Study 2, we found that larger discrepancies were associated with more self-concept change regardless of both the researcher hypothesis communicated at the beginning of the study and participants' motivation to (dis)confirm the respective hypothesis.

A significant two-way interaction between the demand conditions and the motivation to (dis)confirm in Study 2 indicated, however, that participants with a very strong motivation to confirm the respective hypothesis changed more in the positive- than in the nil-hypothesis condition, while those with a strong motivation to disconfirm showed the opposite pattern of change. This effect was very small, however, and differences in self-concept change between the conditions were only significant at the extreme ends of our scale. While we did not find such an effect in Study 1, it is possible that the scale we used for assessing the motivation to (dis)confirm in this study was not fine-grained enough and did not enable us to differentiate between medium and high values. Comparing our results with findings from previous research, Coles, Wyatt et al. (2023) found no effect of the motivation to (dis)confirm in their meta-analysis on demand effects. However, as data for the motivation to (dis)confirm was not available in most studies included in the meta-analysis, Coles, Wyatt et al. (2023) presented a set of additional participants with descriptions of the studies included in the meta-analysis and had them rate how motivated they would theoretically be to confirm or disconfirm the communicated hypothesis. They then examined whether these additionally obtained ratings impacted demand effects and did not find that this was the case. It is possible, however, that ratings from third parties instead of the participants who had originally taken part in the studies did not reflect participants' motivation to (dis)confirm well enough to detect a small effect that this variable might

have had, as indicated by the results from our Study 2. All in all, while demand characteristics played a role in some specific cases in our studies, they did not explain the effect of discrepant feedback, and specifically the size of discrepancy, on self-concept change.

Theoretical Implications

The present research adds to the literature by explicitly examining the role of demand effects in self-concept change after discrepant feedback. In doing so, we provide the strongest evidence so far that self-concept change found after discrepant feedback does not merely reflect demand effects. While previous research has discussed the potential role of demand effects (Brotzeller et al., 2025; Tao et al., 2025) and has tried to minimize it by using cover stories (Kube, Rief, et al., 2019; Kube & Glombiewski, 2021; Tao et al., 2025), our approach was to actively create different types of demand characteristics and determine whether the effects of discrepant feedback on self-concept change hold up regardless of which demand characteristics were created. According to Mayo (1991), this approach creates strong evidence because it minimizes the likelihood that we falsely observed self-concept change after discrepant feedback: If such self-concept change did not exist outside of demand effects, then observing it in a nil-hypothesis condition in which participants are informed that no change is expected should be highly unlikely. And while we found that demand characteristics had an impact under specific conditions, they did not fully explain feedback effects on self-concept change for our effects of interest.

Our research furthermore suggests that participants' motivation to (dis)confirm the researcher hypothesis should be taken into account. In previous research, this was not always done when studying demand effects (Coles, Gaertner, et al., 2023). In their meta-analysis on demand effects, however, Coles, Wyatt et al. (2023) showed that while participants on average respond in a way confirming the communicated hypothesis, there is variation in how they respond. In our research, we found some evidence suggesting that when participants are strongly motivated to confirm or disconfirm the communicated hypothesis, this can impact how they respond to demand characteristics. While this

effect was small and should be interpreted with caution as there were few data points at the extreme ends of our scale, it implies that participants can and do adapt their responses when they are highly motivated to do so. This contradicts previous research questioning whether participants are able to adapt their responses even if they are motivated to (Mummolo & Peterson, 2019).

Limitations and Future Research Directions

Across two studies and for two domains of the self-concept, our results do not indicate that findings on self-concept change after discrepant feedback merely reflect demand effects. Nevertheless, there are several limitations to and directions for future research based on the present research. While we did not find that effects of the feedback and, specifically, the size of discrepancy on self-concept change were merely produced by demand characteristics, our findings cannot be generalized to all kinds of research on self-concept change after discrepant feedback. Previous research on the topic has, for example, examined the effects of different feedback, source, and receiver characteristics on how feedback translates to changes in the self-concept. Despite our findings suggesting that the basic feedback effect is not merely produced by demand characteristics, researchers should be aware that demand effects might have a larger impact when examining the effect of specific other variables in this context.

Furthermore, future research should more closely examine the conditions under which demand characteristics impact participants' responses. Previous research has sometimes found that demand effects impact but do not fully explain their phenomena of interest (Coles, Gaertner, et al., 2023; de Quidt et al., 2018), while little to no demand effects were found in other research (Mummolo & Peterson, 2019). Investigating which factors might promote an effect of demand characteristics, Mummolo and Peterson (2019) found some evidence for demand effects when participants were financially incentivized for responding in a hypothesis-consistent manner. In our research, one condition under which we detected a small demand effect was for participants who were strongly motivated to

(dis)confirm the communicated hypothesis. These findings might indicate that there needs to be a strong incentive for participants to adapt their responses to a communicated hypothesis.

However, it is so far unclear whether these findings can be generalized across different contexts and research questions. Future research should therefore further study these and other factors that might impact whether demand effects emerge. Doing so using different methodological approaches can help create a comprehensive understanding of the impact of certain factors. To more extensively study when participants are motivated to (dis)confirm and how this impacts demand effects, for example, researchers could apply an approach suggested by de Quidt et al. (2018): They had participants go through the same experimental procedure twice. The first time, participants did so without any demand manipulation; the second time, a demand manipulation in which different researcher hypotheses were communicated was added. Comparing participants' responses on the outcome measured both the first and the second time can help discern whether the hypothesis communicated before the second time impacted participants' responses in a way confirming or disconfirming the communicated hypothesis.

Moreover, future research should further study "genuine" self-concept change after discrepant feedback. In our research, we do not find that self-concept change after discrepant feedback merely results from demand characteristics. If, instead, changes found in these studies reflect actual changes in participants' self-perceptions, how are these changes to be interpreted? Theoretically, the self-concept is thought to be relatively stable (Shavelson et al., 1976). Long-term changes in self-perceptions should only occur after repeated experiences suggesting that the current self-perceptions no longer reflect what the person is like (Wrzus & Roberts, 2017). We therefore consider self-concept change after single or few instances of discrepant feedback to reflect changes on a latent-state level, meaning that at first, such changes are temporary and situation-specific. Only when similar feedback is given repeatedly and across situations should such changes become long-term, generalized changes in the self-concept. This is consistent with conceptualizations of the self-concept as hierarchical, with stable, higher-level

representations consisting of many situation-specific and less stable lower-level representations (Shavelson et al., 1976). How changes in situation-specific domains of the self-concept condense into changes in generalized domains of the self-concept has not yet been comprehensively examined and is an important topic for future research.

Conclusion

With more and more research examining the role of demand effects regarding specific research questions, the present research investigated their impact in studies on self-concept change after discrepant feedback. Our results suggest that demand effects can, in specific cases, play a role in but are not necessary for self-concept change after discrepant feedback. Furthermore, we do not find that the association between the size of discrepancy between feedback and initial self-concept with self-concept change is merely produced by demand characteristics.

Open Practices

Study materials, data sets, and analysis scripts are openly available at the project's Open Science Framework page (https://osf.io/nj594/?view_only=1938058f03904973957fc06a240094a8). Preregistrations can be found at https://aspredicted.org/rct9-d6sh.pdf for Study 1 and https://aspredicted.org/nqj9-btp4.pdf for Study 2.

References

Agresti, A. (2002). *Categorical Data Analysis*. John Wiley & Sons.

Bender, J., Rothmund, T., & Gollwitzer, M. (2013). Biased estimation of violent video game effects on aggression: Contributing factors and boundary conditions. *Societies*, *3*(4), Article 4. https://doi.org/10.3390/soc3040383

Bergin, A. E. (1962). The effect of dissonant persuasive communications upon changes in a self-referring attitude. *Journal of Personality*, *30*(3), 423–438. https://doi.org/10.1111/j.1467-6494.1962.tb02314.x

Binderman, R. M., Fretz, B. R., Scott, N. A., & Abrams, M. H. (1972). Effects of interpreter credibility and discrepancy level of results on responses to test results. *Journal of Counseling Psychology*, *19*, 399–403. https://doi.org/10.1037/h0033232

Bosch, J., & Wilbert, J. (2023). The impact of social comparison processes on self-evaluation of performance, self-concept, and task interest. *Frontiers in Education*, *8:1033488*. https://doi.org/10.3389/feduc.2023.1033488

Brotzeller, F., & Gollwitzer, M. (2024). Exploring asymmetries in self-concept change after discrepant feedback. *Personality and Social Psychology Bulletin*, 01461672241232738. https://doi.org/10.1177/01461672241232738

Brotzeller, F., Spägele, G. L., & Gollwitzer, M. (2025). I think, therefore I change: Reflection leads to self-concept change after discrepant feedback. *Personality and Social Psychology Bulletin*, 01461672251333466. https://doi.org/10.1177/01461672251333466

Coles, N. A., Gaertner, L., Frohlich, B., Larsen, J. T., & Basnight-Brown, D. M. (2023). Fact or artifact? Demand characteristics and participants' beliefs can moderate, but do not fully account for, the effects of facial feedback on emotional experience. *Journal of Personality and Social Psychology*, *124*(2), 287–310. https://doi.org/10.1037/pspa0000316

Coles, N. A., Wyatt, M., & Frank, M. C. (2023). *A quantitative review of demand characteristics and their underlying mechanisms*. PsyArXiv. https://doi.org/10.31234/osf.io/uw85a

Corneille, O., & Lush, P. (2023). Sixty years after Orne's American Psychologist article: A conceptual framework for subjective experiences elicited by demand characteristics. *Personality and Social Psychology Review*, *27*(1), 83–101. https://doi.org/10.1177/10888683221104368

de Quidt, J., Haushofer, J., & Roth, C. (2018). Measuring and bounding experimenter demand. *American Economic Review*, *108*(11), 3266–3302. https://doi.org/10.1257/aer.20171330

Elder, J., Davis, T., & Hughes, B. L. (2022). Learning about the self: Motives for coherence and positivity constrain learning from self-relevant social feedback. *Psychological Science*, *33*(4), 629–647. https://doi.org/10.1177/09567976211045934

Faul, F., Erdfelder, E., Lang, A.-G., & Buchner, A. (2007). G*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods*, *39*(2), 175–191. https://doi.org/10.3758/BF03193146

Koban, L., Schneider, R., Ashar, Y. K., Andrews-Hanna, J. R., Landy, L., Moscovitch, D. A., Wager, T. D., & Arch, J. J. (2017). Social anxiety is characterized by biased learning about performance and the self. *Emotion*, *17*(8), 1144–1155. https://doi.org/10.1037/emo0000296

Korn, C. W., Fan, Y., Zhang, K., Wang, C., Han, S., & Heekeren, H. R. (2014). Cultural influences on social feedback processing of character traits. *Frontiers in Human Neuroscience*, *8:192*. https://doi.org/10.3389/fnhum.2014.00192

Korn, C. W., Prehn, K., Park, S. Q., Walter, H., & Heekeren, H. R. (2012). Positively biased processing of self-relevant social feedback. *Journal of Neuroscience*, *32*(47), 16832–16844. https://doi.org/10.1523/JNEUROSCI.3016-12.2012

Korn, C. W., Rosée, L. L., Heekeren, H. R., & Roepke, S. (2016). Social feedback processing in borderline personality disorder. *Psychological Medicine*, *46*(3), 575–587. https://doi.org/10.1017/S003329171500207X

Kube, T., & Glombiewski, J. A. (2021). How depressive symptoms hinder positive information processing: An experimental study on the interplay of cognitive immunisation and negative mood in the context of expectation adjustment. *Cognitive Therapy and Research*, *45*(3), 517–528. https://doi.org/10.1007/s10608-020-10191-4

Kube, T., Glombiewski, J. A., Gall, J., Touissant, L., Gärtner, T., & Rief, W. (2019). How to modify persisting negative expectations in major depression? An experimental study comparing three strategies to inhibit cognitive immunization against novel positive experiences. *Journal of Affective Disorders*, *250*, 231–240. https://doi.org/10.1016/j.jad.2019.03.027

Kube, T., Kirchner, L., Lemmer, G., & Glombiewski, J. A. (2022). How the discrepancy between prior expectations and new information influences expectation updating in depression—The greater, the better? *Clinical Psychological Science*, *10*(3), 430–449. https://doi.org/10.1177/21677026211024644

Kube, T., Rief, W., Gollwitzer, M., Gärtner, T., & Glombiewski, J. A. (2019). Why dysfunctional expectations in depression persist – Results from two experimental studies investigating cognitive immunization. *Psychological Medicine*, *49*(9), 1532–1544. https://doi.org/10.1017/S0033291718002106

Leiner, D. (2021). *SoSci survey* (Version 3.2.29) [Computer software]. https://www.soscisurvey.de

Long, J. A. (2019). *_interactions: Comprehensive, user-friendly toolkit for probing interactions. R package version 1.1.0*. https://cran.r-project.org/package=interactions

Markus, H., & Wurf, E. (1987). The dynamic self-concept: A social psychological perspective. *Annual Review of Psychology*, *38*(1), 299–337. https://doi.org/10.1146/annurev.ps.38.020187.001503

Mayo, D. G. (1991). Novel evidence and severe tests. *Philosophy of Science*, *58*(4), 523–552. https://doi.org/10.1086/289639

Meade, A. W., & Craig, S. B. (2012). Identifying careless responses in survey data. *Psychological Methods*, *17*(3), 437–455. https://doi.org/10.1037/a0028085

Müller-Pinzler, L., Czekalla, N., Mayer, A. V., Stolz, D. S., Gazzola, V., Keysers, C., Paulus, F. M., & Krach, S. (2019). Negativity-bias in forming beliefs about own abilities. *Scientific Reports*, *9*(1), 14416. https://doi.org/10.1038/s41598-019-50821-w

Mummolo, J., & Peterson, E. (2019). Demand effects in survey experiments: An empirical assessment. *American Political Science Review*, *113*(2), 517–529. https://doi.org/10.1017/S0003055418000837

Nichols, A. L., & Maner, J. K. (2008). The good-subject effect: Investigating participant demand characteristics. *The Journal of General Psychology*, *135*(2), 151–166. https://doi.org/10.3200/GENP.135.2.151-166

Olson, J. A., & Raz, A. (2021). Applying insights from magic to improve deception in research: The Swiss cheese model. *Journal of Experimental Social Psychology*, *92*, 104053. https://doi.org/10.1016/j.jesp.2020.104053

Orne, M. T. (1962). *On the social psychology of the psychological experiment: With particular reference to demand characteristics and their implications*. *17*(11), 776–783. https://doi.org/10.1037/h0043424

Page, M. M. (1973). On detecting demand awareness by postexperimental questionnaire. *The Journal of Social Psychology*, *91*(2), 305–323. https://doi.org/10.1080/00224545.1973.9923053

R Core Team. (2023). *R: A language and environment for statistical computing. R Foundation for Statistical Computing.* http://www.r-project.org/

Rosnow, R. L., & Aiken, L. S. (1973). Mediation of artifacts in behavioral research. *Journal of Experimental Social Psychology*, *9*(3), 181–201. https://doi.org/10.1016/0022-1031(73)90009-7

Shavelson, R. J., Hubner, J. J., & Stanton, G. C. (1976). Self-concept: Validation of construct interpretations. *Review of Educational Research*, *46*(3), 407–441. https://doi.org/10.3102/00346543046003407

Simmons, J. P., Nelson, L. D., & Simonsohn, U. (2012). *A 21 Word Solution* (SSRN Scholarly Paper 2160588). https://doi.org/10.2139/ssrn.2160588

Swann, W. B., & Hill, C. A. (1982). When our identities are mistaken: Reaffirming self-conceptions through social interaction. *Journal of Personality and Social Psychology*, *43*, 59–66. https://doi.org/10.1037/0022-3514.43.1.59

Tao, R., Zhang, H., Geng, L., Li, Y., & Qiu, J. (2025). The Influence of Trait and State Creative Self-Efficacy on Creative Behavior: An Experimental Study Using False Feedback. *Behavioral Sciences*, *15*(1), 18. https://doi.org/10.3390/bs15010018

Torchiano, M. (2020). *_effsize: Efficient effect size computation_*. https://doi.org/10.5281/zenodo.1480624

Weber, S. J., & Cook, T. D. (1972). Subject effects in laboratory research: An examination of subject roles, demand characteristics, and valid inference. *Psychological Bulletin*, *77*(4), 273–295. https://doi.org/10.1037/h0032351

Wrzus, C., & Roberts, B. W. (2017). Processes of personality development in adulthood: The TESSERA framework. *Personality and Social Psychology Review*, *21*(3), 253–277. https://doi.org/10.1177/1088868316652279

8 General Discussion

Self-concept change in adulthood is thought to result from repeated self-relevant experiences during which an individual learns about themselves (Bleidorn et al., 2021; Shavelson et al., 1976; Wrzus & Roberts, 2017). However, a comprehensive understanding of when and why such experiences impact a person's self-concept is still lacking (Bleidorn et al., 2021; Roberts & Caspi, 2003). Receiving feedback from one's environment is one experience during which an individual receives self-relevant information (Roberts & Caspi, 2003), for instance regarding their abilities, traits, or physical appearance. Following up on some early interest in how feedback impacts the self-concept (Binderman et al., 1972; Swann & Hill, 1982), recent research has therefore aimed to systematically investigate such processes (e.g., Elder et al., 2022; Kube, Rief, et al., 2019; Müller-Pinzler et al., 2019). The goal of this dissertation was to contribute to the current understanding of when and why features of the feedback impact self-concept change, which role reflection plays in feedback-induced self-concept change, and whether a study design commonly used for investigating feedback-induced self-concept change is susceptible to demand effects.

8.1 Overview of Insights

Drawing from theoretical approaches on the self-concept (Shavelson et al., 1976), on reactions to expectation-disconfirming information (Panitz et al., 2021), and on mechanisms underlying changes in the self-concept (Silvia & Duval, 2001; Wrzus & Roberts, 2017), I presented three manuscripts including nine studies.[39] Findings across studies provided evidence that the self-concept can change after few or even single instances of receiving self-relevant feedback. This is a noteworthy finding in light of recent evidence from a study on expectation violations showing that after receiving discrepant information

[39] Three of the nine studies were used in two manuscripts (see Appendix).

once or under specific circumstances, people tend to immunize or assimilate rather than change their expectations (Pietzsch & Pinquart, 2023).

Furthermore, the studies demonstrated self-concept change after feedback across different domains of the self-concept such as general knowledge and the health-consciousness of one's lifestyle. While the structure of the self-concept can differ between people (Shavelson et al., 1976), such domains should be located at higher levels of the self-concept hierarchy than some more situation-specific domains targeted in previous research (e.g., performance expectations for a specific estimation task; Müller-Pinzler et al., 2019). This is in line with other studies (e.g., Eil & Rao, 2011) and indicates that even domains at higher levels of the hierarchy are responsive to self-relevant feedback. Moreover, in several studies presented as part of this dissertation, participants received performance feedback on a task they had worked on. While this feedback was specific to the task (e.g., percentage of correct responses on a mental cube folding task), the self-concept was always assessed in a more generalized, non-task specific way (e.g., by asking about participants' visual-spatial thinking skills). Subsequent changes in the self-concept thus suggest that task-specific feedback served as an indicator for more generalized self-perceptions, supporting a bottom up approach to self-concept change in which changes in lower-level domains of the self-concept can impact self-perceptions at higher levels of the hierarchy (Mummendey, 2006).

Findings from Manuscript 1 on the conditions under which feedback impacts the self-concept consistently showed larger intentions for self-concept change (Study 1) and actual self-concept change (Studies 2-4) the larger the discrepancies between feedback and initial self-concept. Furthermore, intentions for and actual self-concept change after discrepant feedback were negatively biased (i.e., larger after negative than positive feedback) across several studies and domains of the self-concept. While examining the effects of the size and direction of discrepancy on self-concept change was the main focus only in Manuscript 1, the additional studies reported in Manuscripts 2 and 3 provide further

evidence in this regard. Even though the studies differ in many regards (e.g., the self-concept domains they focused on or the operationalization of the feedback), their findings on the main effects of the size and direction of discrepancy are highly consistent: Results from all studies—including the ones reported in Manuscripts 2 and 3—showed more self-concept change for larger sizes of discrepancy (see Appendix). Moreover, findings from all but one of the nine studies included in this dissertation demonstrated more self-concept change after negative than after positive feedback. These findings thus question the assumption of a robust and universal positivity bias in the integration of self-related information (Sharot & Garrett, 2016) and broaden our knowledge on when a negativity bias can occur. For instance, some have theorized that receiving self-relevant information on a personally relevant domain without directly being able to improve on the domain during the study should promote a positivity bias (Müller-Pinzler et al., 2019; Villano et al., 2023). Our studies show that this is not necessarily the case: One of the studies from Manuscript 2, for instance, focused on the health-consciousness of one's lifestyle. Participants, on average, indicated that it is important to them to have a health-conscious lifestyle. Furthermore, feedback was not based on multiple trials of a performance test that participants worked on and could improve their performance on during the study but on a scale participants responded to. While this should promote a positivity bias according to Müller-Pinzler et al. (2019) and Villano et al. (2023), self-concept change was negatively biased in our study.

Manuscript 1 furthermore aimed to test one potential explanation for the differing findings on positively and negatively biased self-concept change. We varied whether it was allegedly possible to improve on the targeted domain of the self-concept or not, aiming to trigger self-improvement and self-enhancement motivations, respectively. As we found a negativity bias across conditions, we were unable to explain the differing patterns of asymmetric self-concept change found across previous studies. However, by focusing on the opportunity for improvement, we did not directly target motives for self-improvement and self-enhancement and it is possible that our manipulation was unsuccessful in

triggering them. Apart from motives for self-enhancement and self-improvement, several other explanations for asymmetric self-concept change have been suggested, for instance focusing on other motivational processes (e.g., self-verification; García-Arch et al., 2024) or non-motivational factors (e.g., diagnosticity of feedback; cf. Manuscript 1 of this dissertation). However, there is little or only inconsistent evidence for many existing explanations. For instance, evidence on the diagnosticity (i.e., informational value) of the feedback impacting biased self-concept change is sparse so far. The theoretical idea behind this explanation is that whether self-concept change is positively or negatively biased depends on the informational value that each of these two types of feedback has in a specific context—the more informative the feedback, the more impact it should have on the self-concept (cf. Manuscript 1 of this dissertation). For example, when a certain person is known for providing mostly positive feedback, receiving negative feedback from this person should be perceived as more informative and thus impact self-perceptions more strongly than receiving positive feedback from this person (and vice versa). First evidence indicates that this might be a promising explanation for the biased integration of information about the self: Will et al. (2017) found that the base rate of positive and negative feedback from certain feedback sources impacted how strongly positive and negative feedback affected momentary feelings about the self. Further evidence across different domains of the self-concept is needed to determine whether this explanation can fully explain biased self-concept change.

Manuscript 2 focused on the relationship between reflection and self-concept change. Even though the studies differed regarding their procedure, the operationalization of the feedback, and the targeted domains of the self-concept, our findings were highly consistent in that more reflection on discrepant feedback was associated with or led to more self-concept change. While previous research has often focused on the impact of reflection in longer-term processes of learning about the self (e.g., Pals, 2006; Quintus et al., 2021), we examined single self-relevant experiences during which an

individual received feedback and reflected on it. In using this fine-grained approach, we improved on shortcomings from previous studies by linking reflection on a specific experience with subsequent changes in the respective self-perceptions (cf. Quintus et al., 2021). Our findings thus provide important insights into the short-term effects of reflection on self-concept change. The studies in Manuscript 2 provided mixed evidence on reflection being especially relevant after negative compared to positive feedback: Some results pointed in this direction, although the effect was not consistent across studies. One step towards a better understanding of this effect might be to investigate what people reflect on after receiving positive compared to negative feedback.

Studies from Manuscript 3 examined the role of demand effects in studies asking participants for their self-perceptions before and after presenting them with feedback. Findings suggested that feedback-induced self-concept change does not merely result from such methodological artifacts, although they impacted self-concept change after feedback under specific conditions. One such condition were cases in which participants were extremely motivated to adjust their responses to confirm or disconfirm the researcher hypothesis. These studies thus suggest that while demand effects can play a role under specific conditions, they are do not fully account for the effects of feedback on self-concept change.

All in all, the present research reiterates the importance of feedback as a source of self-relevant information. It provides evidence on the size and direction of the discrepancy between feedback and initial self-concept as consistent predictors of self-concept change. Furthermore, it presents a first test of the opportunity for improvement as a possible explanation for biased self-concept change. Moreover, it demonstrates that reflection on discrepant feedback plays an important role in producing subsequent self-concept change. Importantly, the dissertation provides empirical evidence suggesting that self-concept change after discrepant feedback is not a mere product of demand effects.

8.2 Limitations and Open Questions

There are several limitations that should be considered when interpreting the results of this research program and open questions that arise from the present research. The aspects that are discussed in the following are closely related to studies from all three manuscripts.

8.2.1 Generalizability

In the studies reported in the present dissertation, we examined feedback-induced self-concept change and found that even single instances of receiving feedback impacted participants' self-perceptions. However, most of our studies examined the relationship between feedback and self-concept change under similar conditions and it is unclear whether inferences drawn from our findings apply beyond the studied conditions (i.e., whether our findings generalize to other conditions). In the following, several aspects that might limit the generalizability of the present findings will be discussed. These aspects relate to the four dimensions delineated in Cronbach and Shapiro's (1982) framework, who highlighted that generalizability should be discussed across treatments (i.e., operationalizations of the independent variable), observing operations or outcomes (i.e., operationalizations of the dependent variable), settings (i.e., environments in which a study's data are generated), and units (i.e., samples or populations).[40]

First, it is unclear whether the present findings can be generalized across treatments. In all studies of the present research, the self-relevant information participants were presented with was one main independent variable of interest. In most of our studies, we operationalized this variable by presenting participants with explicit feedback. Yet, self-relevant information can also be provided in more subtle, nonverbal ways, for instance through a headshake or a raised eyebrow. In such cases, the

[40] For an update of the framework including two further dimensions that will not be discussed in this dissertation, see Findley et al. (2021).

information can be more ambiguous (e.g., when it is unclear what the raised eyebrow refers to) and it is possible that it has no or little influence on specific domains of the self-concept. Furthermore, we used quantitative feedback and ensured that it was directly comparable to participants' self-perceptions (as the two were measured or presented on the same scale). Thus, we made potential discrepancies between feedback and self-concept highly salient. This is considered important in motivating self-concept change (Higgins, 1987; Silvia & Duval, 2001). However, in real life, such discrepancies are often less quantifiable. Even when feedback is presented in a quantitative format (e.g., after a performance test), self-perceptions are usually not quantified in the same manner. This might limit discrepancy salience and awareness and reduce subsequent self-concept change.

Second, it is unclear whether our findings generalize across outcomes. In our studies, we assessed our main dependent variable of interest, self-concept change, by asking participants to self-report their self-perceptions twice during the study and comparing the two self-reports. Across studies, we used several different scales or items for assessing participants' self-perceptions and, across these different measures, found that, on average, the self-concept changed after participants received discrepant feedback. However, all of our measures relied on self-reports and were, thus, direct measures of the self-concept. Such measures are thought to assess the explicit self-concept. None of our studies used indirect measures, for instance via implicit association tests (IATs), which are considered measures for the implicit self-concept (Perugini et al., 2021). Based on the present research, it is therefore unclear whether our findings generalize to indirect measures or the implicit self-concept.[41] Previus research that might be informative regarding this issue is sparse. There is some evidence

[41] Underlying this question is another unresolved issue: It is currently unclear whether direct and indirect measures are two ways of assessing a single construct or whether the explicit and implicit self-concepts are two separate constructs that are measured by direct and indirect measures, respectively. For more information on this issue, see Perugini et al. (2021).

showing that feedback can produce changes on indirect measures of the self-concept: Dijksterhuis (2004) found that presenting participants with positive compared to negative feedback on an intelligence test increased their indirectly measured levels of self-esteem. Yet, this was only found for one domain of the self-concept. Furthermore, no direct measure was employed to allow comparing changes on the two types of measures. However, other research has shown that changes on direct and indirect measures in response to self-related information are not always symmetric (Grumm et al., 2009). Thus, whether our findings on the effect of feedback can be generalized to indirect measures or the implicit self-concept remains a topic for future research.

Third, it is unclear whether our findings can be generalized across settings. Our findings were obtained in an artificial study setting, which might limit their generalizability. Due to the instructions given during the study, participants in most of our studies were aware that we were interested in certain self-perceptions and knew that they would work on a test or scientific scale and receive feedback on it. This might have increased their levels of self-awareness and self-reflection. In line with this, participants in most correlational studies in Manuscript 2, on average, agreed that they thought a lot about the feedback and the respective domain of the self-concept during the study. Even our attempt to experimentally suppress reflection was only moderately successful, with participants still self-reporting a considerable amount of self-reflection (cf. Manuscript 2, Study 2). When feedback is given in real life, people often do not know that it will happen beforehand, and the distractions of everyday life might diminish how much people reflect on it (e.g., during a hectic situation at work). In line with our findings from Manuscript 2, this might then limit the effects of the feedback on self-concept change.

Fourth, it is unclear whether our findings generalize across samples. One sample characteristic that might be interesting here is the cultural background. The samples in our studies consisted of convenience samples from Western countries. Inferences drawn based on our samples do not necessarily apply to samples with a different cultural background: Cultural differences in the

conceptualization of the self and in the norms surrounding whether and how feedback is given to others can impact perceptions of as well as reactions to self-relevant information (Luo et al., 2013; Markus & Kitayama, 1991). For instance, people from Western countries are thought to construe their selves as distinct and independent from others. In contrast, individuals from non-Western countries are thought to view themselves as more interdependent and connected with others (Markus & Kitayama, 1991; Pfabigan et al., 2018). These cultural differences are not only thought to impact the content of the self-concept; research has also shown that interdependent individuals react differently to self-related information and integrate social feedback to a larger degree than individuals from independent cultures (Korn et al., 2014; Markus & Kitayama, 1991; Pfabigan et al., 2018). Future research should thus further examine the effects of feedback on self-concept change in culturally diverse samples.

Beyond these aspects, one big challenge for many studies on self-concept change after feedback is the possibility that changes in the self-concept might reflect demand effects rather than actual changes in self-perceptions. This issue is linked to the generalizability of such findings: If changes in the self-concept were a product of demand effects, they should not generalize across all dimensions delineated by Cronbach and Shapiro (1982), for instance across different operationlizations of the independent or dependent variable. Manuscript 3 provides some evidence on the role of demand effects: Our findings do not indicate that differences in self-reports are merely produced by demand characteristics. Yet, it is a question in itself whether our findings on the role of demand effects generalize beyond the conditions under which we examined them. Other researchers have, for instance, varied characteristics of the task the feedback was based on and adapted the measurement of self-concept change (i.e., they varied aspects of the treatment and outcome according to Cronbach & Shapiro, 1982) in ways that might increase the salience of potential demand characteristics and lead to more demand effects: In some studies, the initial self-rating and the feedback as well as a next self-rating were only divided by a very short task consisting of a single item (e.g., a single estimation

question; Czekalla et al., 2021; Müller-Pinzler et al., 2019), while our tasks or scales took several minutes to complete. In some other studies, participants first worked on a task. They indicated their initial self-perception, received feedback, and again indicated their self-perception only afterwards and in closer succession than in our studies (e.g., Elder et al., 2022; Ertac, 2011; Korn et al., 2016). In such studies, the comparison between the two self-ratings and, thus, the potential researcher hypothesis might be more salient. Some other studies have presented participants with several rounds of (manipulated) feedback and assessed participants' self-perceptions after each round to investigate how changes in the self-concept accumulate over several instances of feedback (e.g., Kirchner et al., 2023; Müller-Pinzler et al., 2019; Zamfir & Dayan, 2022). Repeatedly receiving consistent feedback and being asked to indicate one's self-perceptions after each feedback might create stronger demand characteristics and thus lead to more demand effects than in our studies. Investigating whether our findings on demand effects can be generalized across operationalizations of the independent and dependent variables in the context of self-concept change after feedback will be a task for future research.

8.2.2 Considerations on Discrepant Feedback

The present research aimed at examining self-concept change in response to discrepant feedback. To this end, participants were presented with feedback on a certain domain of the self-concept. Like much of the previous research, we assumed that participants would have an implicit, shared understanding of how to interpret this feedback. For instance, when presenting participants with a test result regarding a certain domain of the self-concept, we assumed that they would intuitively understand whether high levels on this domain were desirable and, thus, whether a feedback we gave them was positive or negative compared to their self-perceptions. However, we did not comprehensively test whether this was the case. For instance, we only tested whether participants' perceptions matched our understanding of which feedback was positive or negative in one of our studies. In this study, which focused on spatio-visual thinking skills, the large majority of participants

interpreted positive and negative feedback in line with our understanding. This might be the case for most of the other studies in this dissertation, which focused on self-concept domains for which there might be a broad consensus on whether they are desirable or not (e.g., emotion recognition abilities or general knowledge; cf. Manuscripts 1 and 2 of this dissertation), and for many studies from previous research in general. Yet, this might not always be the case. Being presented with the feedback that one is sensitive or lenient might be perceived as positive by many and across many situations (cf. Elder et al., 2022). However, when a teacher is having trouble with unruly students and is told that they are lenient, for example, they might consider this to be negative feedback. Furthermore, positive and negative levels on a certain domain of the self-concept might not always be best defined by a linear relationship from highly negative levels at the one end of the scale to highly positive levels at the other end. For conscientiousness, for instance, medium to high levels might be considered most positive, while extremely high levels might be considered perfectionistic or obsessive and thus be perceived as less positive. Future research should keep such considerations in mind when conceptualizing and operationalizing positive and negative feedback. This might mean making underlying assumptions on positive and negative feedback explicit or retroactively assessing whether participants perceived their feedback as positive or negative (cf. Manuscript 1, Study 2 of this dissertation).

Taking this one step further, future research could also more explicitly examine why people interpret a feedback in a certain way (for instance, as positive or negative). More specifically, future research could examine which standard people draw upon to understand what a feedback means. Such standards have been defined as “mental representation[s] of correct behavior, attitudes, and traits” (Duval & Wicklund, 1972, p. 3). They help interpret a feedback: The information that one has received a C on a test, for instance, is more informative combined with the additional information that grades can range from A to F and that A is considered the best grade. Theoretically, there might be several different standards that might become salient depending on features of the person, the feedback, and the

broader situation. When a person then receives feedback and contrasts it with their self-perception, the salient standard might not only impact how the feedback is interpreted, but it might also influence affective and motivational reactions to the feedback and its impact on the self-concept.

One theoretical approach highlighting several such standards is self-discrepancy theory. It posits that two representations of the self that can serve as standards for evaluating the current, actual self are the ideal self (i.e., representations of one's own or a significant other's hopes or aspirations for the self) and the ought self (i.e., representations of responsibilities or duties oneself or a significant other ascribes to the self; Higgins, 1987). While feedback might simply be understood as an external assessment of an individual's actual self (which can be consistent with or discrepant from the individual's own perception), it might also make representations of the ideal or ought selves and their potential discrepancies with the actual self salient. For instance, when an individual is learning a language voluntarily, low scores on a language test might increase the salience of discrepancies between the current and the desired (i.e., ideal) language skills, while feedback from their partner that they are not a very tidy person might increase the salience of discrepancies between the current and ought levels of tidiness. Higgins (1987) suggests that different types of discrepancies should produce different reactions. For instance, actual:ideal discrepancies are thought to represent the absence of positive outcomes because an ideal self could not be achieved and are thus suggested to lead to dejection-related emotional reactions (e.g., disappointment, shame). Actual:ought discrepancies are thought to represent the presence of negative outcomes as not fulfilling one's duties can be associated with sanctions and are thought to be associated with agitation-related emotions (e.g., feeling threatened, self-contempt; Higgins, 1987). Consistent with the close link between emotions and motivation (Leary, 2007), the interpretations of and emotional reactions to the different types of discrepancies are likely associated with certain motivational states (Higgins, 1987). Feeling threatened might, for instance, trigger defensive reactions and a motivation to self-enhance (Müller-Pinzler et al., 2019). This might also

impact reactions to discrepant feedback. Evidence on the different affective reactions to the discrepancies is mixed (Boldero et al., 2005; Mason et al., 2019); however, several studies have found that different types of discrepancies lead to different affective states (e.g., Barnett et al., 2017; Higgins et al., 1986; Petrocelli & Smith, 2005). The results from these studies suggest that these relationships might be more complex than originally suggested and that the inconsistent findings might furthermore be rooted in methodological and analysis issues. In the present research, we did not consider which standards might have been salient when presenting participants with feedback. To the best of my knowledge, this idea has not been discussed or empirically investigated by other research in the context of self-concept change after feedback, either. One avenue for future research might thus be to investigate whether different features of the feedback and the broader situation impact which standards are made salient, what this means for affective and motivational reactions to the feedback, and how it might impact self-concept change after discrepant feedback.

8.3 Directions for Future Research

In the following, several directions for future research that go beyond the topics raised in the previous sections and the three manuscripts will be discussed. Before doing so, I would like to highlight the importance of conceptual clarity and consistency in using terms when conducting future research. Previous research has often used the same terms when referring to different concepts (jingle fallacy; Corsini, 2016). The term *self-concept change* has been used, for instance, to describe changes in self-perceptions regarding a specific domain of the self (Korn et al., 2012; Shavelson et al., 1976) or to describe shifts in which aspects of self are considered most central to a person's identity (Gore & Cross, 2011). Furthermore, different terms have been used when referring to the same concepts, even within one manuscript or research stream (jangle fallacy; Corsini, 2016). When describing a person's self-perceptions, for instance, researchers have used different terms such as *self-concept* (Bosch & Wilbert, 2023; Korn et al., 2012), (*self-*/*self-related*) *beliefs* (Czekalla et al., 2021; Eil & Rao, 2011; Ertac, 2011;

Möbius et al., 2022; Müller-Pinzler et al., 2019), or *self-views* (Elder et al., 2022; Korn et al., 2014). This impedes the integration of different findings, which is especially central in research on self-concept change as it is studied by researchers from different subdisciplines such as social psychology and educational sciences (e.g., Bosch & Wilbert, 2023), cognitive psychology and neuroscience (e.g., Korn et al., 2012), clinical psychology (e.g., Kube et al., 2022), or behavioral economics (e.g., Möbius et al., 2022). As a first step, future research should explicitly define and consistently use terms within a manuscript and across research streams consisting of multiple publications. Such definitions can then be used to compare conceptualizations and work towards terminological consistency across disciplines.

8.3.1 Understanding Different Reactions to Discrepant Feedback

This dissertation focused on feedback producing changes in people's self-concept. However, discrepant feedback can produce reactions other than self-concept change, for instance denial of the feedback relevance or behavioral changes aimed at producing future expectation-confirming outcomes (e.g., studying more in order to receive a better grade in a future exam; Brandtstädter & Greve, 1994; Panitz et al., 2021). Previous research has started more systematically investigating under which conditions feedback leads to specific reactions. Some research has, for instance, focused on understanding when feedback produces changes in the self-concept (e.g., Elder et al., 2022; Korn et al., 2012; Müller-Pinzler et al., 2019). Other research has focused on identifying conditions under which feedback impacts subsequent behavior (e.g., Casal et al., 2017; Hermsen et al., 2016; Schembre et al., 2018; Straub et al., 2023). Yet other research has examined under which conditions feedback is devalued or (not) accepted (e.g., Anseel & Lievens, 2009; Henss & Pinquart, 2022). These different reactions to feedback correspond to the coping mechanisms delineated by Panitz et al. (2021): Changing one's self-concept would be considered an accommodative reaction, behavior changes aimed at producing future feedback that is consistent with the self-concept would be considered an assimilative reaction, and devaluing the feedback would be one type of immunizing reaction. However, we do not

yet have a comprehensive understanding of when and why feedback produces these different reactions, and specifically of when and why certain reactions are more likely than others.

Studies measuring all three types of reactions in response to discrepant feedback can help in improving our knowledge in this regard: They do not only enable a comparison of when a certain reaction is more likely than the other, but they also allow controlling for the overlap between the reactions. For instance, immunization and assimilation conceptually overlap in that they can both contribute to the persistence of expectations, while accommodation refers to expectation change (Panitz et al., 2021). So far, few studies on reactions to receiving self-discrepant information have included more than one reaction and there are several limitations to these studies: Many of them were conducted in the context of violated achievement expectations (Henss & Pinquart, 2022, 2023, 2024; Orphal & Pinquart, 2025; Pinquart et al., 2021), used vignettes with hypothetical cases instead of providing participants with feedback on their actual performance (Henss & Pinquart, 2024; Orphal & Pinquart, 2025), and assessed reactions to the discrepant information using different, often self-developed and unvalidated scales (Bendel et al., 2023; Gesualdo & Pinquart, 2022; Henss & Pinquart, 2024; Orphal & Pinquart, 2025). Future research should aim to close this gap in the research. A first step would be to develop reliable and valid measures for assessing reactions to discrepant information. In a second step, conducting studies that assess all three reactions to discrepant, self-relevant information across different contexts and using actual feedback instead of vignettes can help understand when and why one reaction is more likely than the other. For example, previous research indicates that when an event that disconfirms an expectation is perceived as controllable, individuals are more likely to make an effort to fulfill their expectations (i.e., assimilate), while they are more likely to change their expectations (i.e., accommodate) when it is perceived as uncontrollable (Gesualdo & Pinquart, 2022).

To disentangle the different reactions and understand their interrelations, future research should furthermore examine the temporal dynamics of the different reactions, with a particular focus on

whether some of them can occur sequentially. Most research on the topic has investigated the three reactions at the same points in time directly after presenting the discrepant information (Gesualdo & Pinquart, 2022; Henss & Pinquart, 2022, 2023, 2024; Orphal & Pinquart, 2025). This is consistent with previous conceptualizations of the coping mechanisms as similarly immediate responses to violated expectations (Brandtstädter & Greve, 1994; Rief et al., 2015). However, more recent theoretical approaches have conceptualized only immunization and accommodation as immediate responses, whereas assimilation is understood to be more closely linked to a potential future expectation violation and might thus happen at a later point in time (Panitz et al., 2021). Some have further suggested that assimilation is always preceded by a more immediate reaction, for instance accommodation: An individual might change their expectations in response to discrepant information, which causes subsequent changes in behavior (Panitz et al., 2021). It remains an avenue for future research to determine whether this is actually the case or whether discrepant information can directly cause assimilation without accommodation.

A comprehensive understanding of when and why feedback produces different reactions is not only interesting theoretically but also in applied contexts in which expectation violations or self-relevant feedback are aimed at producing one specific reaction but not another. On the one hand, a therapeutic technique aimed at changing certain self-related cognitions by providing self-relevant feedback (cf. Folkersma et al., 2021; Saxton et al., 2021) is less effective if the patient, instead of changing these cognitions, simply changes their behavior to match their existing cognitions. On the other hand, some types of feedback in an organizational context are primarily aimed at producing behavior changes (Bracken & Rose, 2011). Similarly, when people give feedback in everyday life, they often want to impact the recipient's behavior but do not have the goal to change their self-concept (Gallrein et al., 2019). Thus, further knowledge of when and why certain reactions are more likely than others can help in effectively creating desired outcomes.

8.3.2 Linking Short-Term Processes with Long-Term Change

One direction for future research could furthermore be to more closely examine the link between short-term and long-term processes of self-concept change. Theoretically, single self-relevant experiences should produce smaller, short-term changes in the self-concept, which, over time and through repetition, cumulate into larger, lasting changes (Mummendey, 1988; Wrzus & Roberts, 2017). Only recently, research has started examining how long self-concept changes after single self-relevant experiences last as well as how, when, and why such changes accumulate over several self-relevant experiences. There is first evidence indicating that self-concept change after discrepant feedback lasts beyond the situation in which the feedback was given. One study showed that changes in self-perceptions after positive feedback were partly retained at a two-week follow-up (Kube & Glombiewski, 2022). Another study used a social stress test paradigm by having participants hold a speech in front of expert judges and presented participants with feedback from these judges. Some of the subsequent self-concept change after this likely highly memorable self-relevant experience was retained at a follow-up several months later (Koban et al., 2017). These studies thus indicate that changes in the self-concept after receiving self-relevant information can, in some cases, be retained over several weeks or even months. However, we do not yet have a comprehensive understanding of how long changes after different types of self-relevant information hold (e.g., across different types of positive and negative feedback that are commonly received in everyday life) and how the results found in these highly controlled studies translate to more naturalistic settings.

Research has further started investigating how changes in the self-concept accumulate over several instances of receiving self-relevant information. Findings from Manuscript 1 showed no differences in self-concept change for participants working on one versus three subsequent tasks and receiving consistent feedback on each. Some other studies investigated larger numbers of instances during which participants received feedback by having participants work on several trials of a task and

presenting them with feedback on each trial. Their results showed that participants changed their self-perceptions over the course of these trials and in line with the feedback presented to them (Kirchner et al., 2023; Müller-Pinzler et al., 2019; Zamfir & Dayan, 2022). Such highly controlled online or laboratory experiments allow investigating self-concept change across several self-relevant experiences while experimentally varying certain factors that might impact change trajectories. However, responses to highly controlled feedback in an artificial study setting are not always valid proxies for naturally occurring responses. Field-based methods such as time- or event-based experience sampling provide important insights into real-life situations in which an individual receives self-relevant information and into the individual's responses in such situations. One study using such a methodology has linked everyday self-relevant experiences with changes in some corresponding domains of the personality self-concept (Quintus et al., 2021). However, self-reports were only assessed at 6-month intervals. Therefore, examining changes in response to single self-relevant experiences and detailed trajectories over time was not possible in this study, but it would be desirable to do so in future research.

One strand of research that could benefit from applying a combination of highly controlled experiments and field-based research is the study of reflection as a mechanism underlying self-concept change. Here, one next step could be manipulating or measuring reflection across several instances of self-relevant feedback that is spaced out over several weeks to test how reflection contributes to the accumulation of changes across time. This would also enable examining whether reflection and self-concept change are associated in a linear or non-linear fashion. It is possible, for instance, that the effect of reflection on self-concept change increases up to a certain point and then flattens when additional reflection doesn't lead to many additional insights anymore. Furthermore, event-sampling studies could aim to assess the amount and content of reflection occurring after real-life self-relevant experiences in more detail and to more closely connect it to self-concept change than was possible in previous research, in which reflection was averaged across self-relevant experiences (Quintus et al., 2021).

8.3.3 Volitional Self-Concept Change

This dissertation focused on self-concept change that was produced by feedback but not necessarily intended by the recipient of the feedback. However, individuals might also intentionally want to change their self-perceptions. In the last decade, a growing body of research has investigated volitional changes in personality traits (Haehner et al., 2024; Hudson, Fraley, et al., 2020). Prior work on this topic has, for instance, examined who wants to change on which traits, whether and under which conditions change goals predict changes in self-reported traits, and how interventions can support volitional changes. Findings showed that a majority of people want to change aspects of their personality. Change goals were found to be especially pronounced in people who are low on certain desirable traits and in people who are dissatisfied with certain aspects of their lives (Hudson & Roberts, 2014). Furthermore, change goals were linked with actual changes in self-reported traits over several weeks or months (Hudson, Fraley, et al., 2020; Hudson & Fraley, 2015), although these changes seem to be conditional on the person performing behaviors related to the desired trait level (Hudson et al., 2019). To facilitate attempts at volitional change, researchers have developed psychological interventions aimed, for instance, at supporting the development of implementation intentions and at attaining behavioral change goals (Hudson et al., 2019; Hudson & Fraley, 2015). Furthermore, there has been much discussion on the characteristics of the person (e.g., beliefs on whether personality can change) and the intervention (e.g., support of behavioral change, progress feedback) that increase the efficacy of such interventions (Allemand & Flückiger, 2022; Haehner et al., 2024; Hudson, 2021a, 2021b). This discussion has partially drawn from findings in psychotherapy research, which have shown that clinical interventions targeting specific or broad mental problems can produce accompanying changes in personality traits (Allemand & Flückiger, 2017). Studies on volitional personality change have further shown that changes in trait self-perceptions in a desired direction are associated with increased life satisfaction (Olaru et al., 2023). However, research so far has mostly focused on volitional changes in

(self-reported) personality traits, and specifically in the Big Five traits (with one exception of a study focusing on volitional changes in adult attachment; Hudson, Chopik, et al., 2020).

Self-perceptions in domains other than personality traits were rarely focused on, although there is some research from related fields that might be informative here: Some research from the educational and health sciences as well as from a clinical context has investigated how to improve how individuals perceive themselves and "enhance" the self-concept (Brown et al., 2024; Craven et al., 2003; Huflejt-Łukasik et al., 2015; Niveau et al., 2021; O'Mara et al., 2006). Many studies in this area have focused on the effectiveness of interventions in producing changes in the self-concept (e.g., Bang et al., 2022; Der Pan et al., 2014; Roepke et al., 2011; Shaikh, 2018). Importantly, participants of these interventions were not necessarily aware of or voluntarily chose the goal to change a certain aspect of their self-concept. Findings from these studies therefore cannot directly be generalized to volitional self-concept change. In combination with the existing findings on volitional personality change, they might nevertheless provide starting points for future research on volitional changes in all kinds of self-perceptions. Results from studies on self-concept interventions show, for example, that such interventions can successfully produce changes both in specific domains of the self-concept (e.g., physical self-concept; Bang et al., 2022; Der Pan et al., 2014) as well as on measures of global self-concept or self-esteem (Chen et al., 2006; Der Pan et al., 2014; Shaikh, 2018; Van der Aar et al., 2022). Researchers have furthermore started identifying conditions under which interventions are especially effective and mechanisms underlying their effectiveness (Bang et al., 2022; Niveau et al., 2021; O'Mara et al., 2006), although the current knowledge in this regard is still incomplete (Brown et al., 2024; Niveau et al., 2021).

When examining volitional changes in the self-concept, different types of changes might be of interest. One type of change might be people changing their self-perceived level on a certain domain of the self-concept, while another type might occur when people change which domains of the self-

concept they define themselves through. One example for the first type would be a person volitionally changing their self-perceived math ability from poor to decent. This corresponds to conceptualizations of change in much of the research on volitional changes regarding personality traits and to how self-concept change was conceptualized in the present research (i.e., as changes in the self-perceptions on a specific domain of the self-concept from one time-point to another). One example for the second type of change would be a person volitionally shifting how they define themselves, from an initial focus on their abilities (e.g., “I am someone who is good at all sorts of things”) to a later focus on their social relationships (e.g., “I am someone who is friends with lots of people”). This corresponds to how some other researchers have defined self-concept change (Gore & Cross, 2011). This type of change has received less attention in the literature on volitional change, although some have discussed similar ideas: Some clinical research has, for instance, suggested that therapy can be helpful in changing the structure of the self-concept (Styła, 2015) and in changing how a person perceives their position in the world, for instance regarding other people or society (Bergner, 2025). Changing how one defines oneself might constitute one type of change that people actively seek. For example, an athlete who is suffering from constantly being benched might try to actively shift their identity to focus on other domains of their self-concept. Future research could thus investigate whether change goals regarding the self-concept map onto these two types of changes. If this is the case, it would be interesting to not only examine change goals and processes of volitional change for both of these types of change, but to understand how they work in concert, and whether there are certain conditions under which one type of change is preferred over the other. While the two types of change are not mutually exclusive, it is possible that they serve different functions and that the processes of volitional change differ. For instance, changes in how people define themselves might require changes in the structure of the self-concept, which should be more difficult to achieve than changes in single domains.

9 Conclusion

The present research program aimed at advancing the current understanding of when and why the self-concept changes after discrepant feedback and at investigating the impact of demand characteristics in a study procedure commonly used to examine such effects. Overall, the findings showed that the self-concept in adulthood can change after few or even single instances of receiving self-relevant feedback and that such effects can be found across different domains of the self-concept. Specifically, the present dissertation provides robust evidence for larger changes in the self-concept the larger the discrepancy between feedback and initial self-concept and for negative compared to positive feedback. Contradicting one explanation as to why negative feedback had a larger effect than positive feedback in our studies but the opposite pattern was found in some other studies, the opportunity for improvement did not it impact the effect of positive and negative feedback on the self-concept. This dissertation furthermore demonstrates the importance of reflection for self-concept change across studies and domains of the self-concept. While the present research does not indicate that findings on self-concept change after discrepant feedback are merely a product of demand characteristics, it provides evidence on the conditions under which demand effects might play a role. Further research is needed to enhance our understanding of this methodological issue as well as to explain biased self-concept change after positive and negative feedback. I hope that the present research program can serve as a building block for such research as well as for further basic and applied studies on the topic of self-concept change.

10 Deutsche Zusammenfassung

In ihrem Alltag werden Menschen immer wieder mit Informationen zu sich selbst konfrontiert, die sich beispielsweise auf ihre Fähigkeiten, ihre Eigenschaften, oder ihr Aussehen beziehen. Solche Informationen stimmen nicht immer mit dem überein, was eine Person über sich selbst denkt, und können die Selbsteinschätzungen der Person beeinflussen. Die Selbsteinschätzungen einer Person bilden ihr Selbstkonzept (Shavelson et al., 1976) und hängen mit ihrem Verhalten sowie ihren Kognitionen und ihrem Affekt zusammen. Bisherige Studien haben beispielsweise gezeigt, dass verschiedene Domänen (d.h. inhaltliche Bereiche) des Selbstkonzepts mit der Zufriedenheit in Beziehungen und im Job (Judge & Hurst, 2008; Orth et al., 2012), mit akademischen Leistungen (Marsh & Martin, 2011) und mit gesundheitsfördernden Verhaltensweisen assoziiert sind (Yarcheski et al., 2004). Zunächst wurde angenommen, dass sich das Selbstkonzept in der Kindheit sowie Jugend entwickelt und im Erwachsenenalter stabil ist (Hattie, 1992; Mummendey, 2006). Spätere Befunde zeigten allerdings, dass sich die Selbsteinschätzungen einer Person auch im Erwachsenenalter verändern können (Bleidorn et al., 2021; Graham et al., 2020; Kuster & Orth, 2013; McKinley, 2006; Orth & Robins, 2014). Die Forschung zu Selbstkonzeptveränderungen im Erwachsenenalter hat seitdem stark zugenommen. Bisher liegt jedoch noch kein umfassendes Verständnis davon vor, wann und warum sich das Selbstkonzept im Erwachsenenalter verändert.

In psychologischen Theorien wird angenommen, dass Erlebnisse, bei denen eine Person selbstbezogene Informationen erhält, eine wichtige Rolle für die Veränderung von Selbsteinschätzungen spielen (Mummendey, 1988; Shavelson et al., 1976; Wrzus & Roberts, 2017). Solche selbstbezogenen Informationen kann eine Person beispielsweise erhalten, indem sie ihr eigenes Verhalten beobachtet (Bem, 1972), sich mit anderen Personen vergleicht (Bosch & Wilbert, 2023), oder externe Rückmeldungen zu sich selbst (d.h. Feedback) bekommt (Mummendey, 2006). Dabei kann es sein, dass die neue, selbstbezogene Information nicht mit der Selbsteinschätzung der Person übereinstimmt (also

diskrepant ist) und zu Veränderungen in ihrer Selbsteinschätzung führt. Ein einzelnes solches Erlebnis führt dabei laut theoretischen Überlegungen noch nicht zu großen oder langandauernden Veränderungen im Selbstkonzept. Dies sollte erst der Fall sein, wenn eine Person wiederholt konsistente Informationen zu sich selbst erhält (Mummendey, 1988; Wrzus & Roberts, 2017). Wenn eine Person sich selbst beispielsweise für introvertiert hält und von einem Freund die Rückmeldung bekommt, dass sie bei einer Party extravertiert gewirkt hat, führt dieses einmalige Feedback möglicherweise nur zu kleinen, kurzfristigen Veränderungen in der Selbsteinschätzung der Person. Wenn sie allerdings mehrere ähnliche Rückmeldungen über verschiedene Kontexte und Personen hinweg bekommt, kann das zu größeren, langfristigeren Veränderungen führen. Theoretische Ansätze und empirische Studien stützen dabei die Annahme, dass Feedback eine wichtige Quelle selbstbezogener Informationen ist (z.B. Elder et al., 2022; Korn et al., 2012; Kube et al., 2022; Roberts & Caspi, 2003).

Wenn eine Person diskrepantes Feedback bekommt, entsteht durch die Abweichung des Feedbacks von der Selbsteinschätzung der Person eine Dissonanz und damit ein aversiver Zustand (Festinger, 1957; Panitz et al., 2021). Um diesen Zustand aufzulösen, hat die Person mehrere Möglichkeiten: Einerseits könnte sie ihre Selbsteinschätzung an das Feedback anpassen (*Akkommodation*; Brandtstädter & Greve, 1994; Panitz et al., 2021). Andererseits könnte die Person den Effekt des Feedbacks durch nachträgliche Umdeutung oder Neubewertung minimieren, beispielsweise indem sie das Feedback als unglaubwürdig bewertet (*Immunisierung*), oder sie könnte aktiv darauf hinarbeiten, dass sie solches diskrepantes Feedback in Zukunft nicht mehr erhält, indem sie ihr Verhalten anpasst (*Assimilation*; vgl. Brandtstädter & Greve, 1994; Panitz et al., 2021). Eine Veränderung der Selbsteinschätzung ist also nicht die einzig mögliche Reaktion auf diskrepantes Feedback. Bisherige Forschung hat sich daher unter anderem damit beschäftigt, unter welchen Bedingungen Feedback zu Veränderungen im Selbstkonzept führt. Dabei wurde unter anderem der Einfluss verschiedener Charakteristika des Feedbacks und der Quelle des Feedbacks (z.B. Glaubwürdigkeit; Binderman et al.,

1972), der Domäne des Selbstkonzepts (z.B. ihre Zentralität für die Person; Elder et al., 2022) und der oder des Feedbackempfangenden (z.B. Selbstkonzeptklarheit; Guadagno & Burger, 2007) sowie von Interaktionen zwischen diesen und weiteren Faktoren untersucht. Allerdings bleiben viele Fragen zu den Bedingungen, unter denen Feedback zu Selbstkonzeptveränderung führt, und den dahinterliegenden Mechanismen noch ungeklärt.

In dieser Dissertation stelle ich drei Manuskripte mit neun empirischen Studien vor, die sich weitergehend damit beschäftigen, wann und warum sich das Selbstkonzept nach Feedback verändert (Manuskripte 1 und 2) und welche Rolle ein methodisches Artefakt bei der Untersuchung solcher Prozesse spielt (Manuskript 3). Alle drei Manuskripte fokussieren sich dabei auf Veränderungen in expliziten Selbsteinschätzungen, die häufig bewusst sind und direkt erfragt werden können, und vernachlässigen implizite Selbsteinschätzungen, die häufig unbewusst sind und indirekt erfragt werden können. Manuskript 1 fokussiert sich auf den Einfluss zweier Eigenschaften des Feedbacks auf Selbstkonzeptveränderung. Dabei betrachte ich einerseits den Einfluss der Größe der Diskrepanz zwischen Feedback und ursprünglicher Selbsteinschätzung auf Selbstkonzeptveränderung. Andererseits vergleiche ich den Einfluss von positivem (d.h. besser als die ursprüngliche Selbsteinschätzung) und negativem (d.h. schlechter als die ursprüngliche Selbsteinschätzung) Feedback auf Selbstkonzeptveränderung. Während bisherige Forschungsergebnisse größtenteils einen positiven Zusammenhang zwischen der Größe der Diskrepanz und Selbstkonzeptveränderungen gezeigt haben (Binderman et al., 1972; Kube, Rief, et al., 2019; Swann & Hill, 1982), waren die Ergebnisse hinsichtlich der Effekte von positivem und negativem Feedback gemischt: Die meisten Forschungsarbeiten zu diesem Thema haben gefunden, dass positives Feedback zu mehr Selbstkonzeptveränderung führt als negatives Feedback (*Positivity Bias*; z.B. Eil & Rao, 2011; Elder et al., 2022; Korn et al., 2012, 2014). Allerdings haben einige Studien einen größeren Einfluss von negativem als positivem Feedback gefunden und somit den entgegengesetzten Effekt gezeigt (*Negativity Bias*; z.B. Müller-Pinzler et al.,

2019; Zamfir & Dayan, 2022). Müller-Pinzler et al. (2019) schlugen als Erklärungsansatz für die unterschiedlichen Befundmuster vor, dass Personen negatives Feedback höher gewichten, wenn sie motiviert sind, sich zu verbessern und negatives Feedback als informativ dafür wahrnehmen (S*elf-Improvement*), und positives Feedback höher gewichten, wenn sie die Positivität ihres Selbstkonzepts erhöhen und es vor negativen Informationen schützen wollen (S*elf-Enhancement*; Sedikides & Strube, 1997). Die Ergebnisse aus Manuskript 1 zeigten positive Effekte der Größe der Diskrepanz auf die Bereitschaft zur Selbstkonzeptveränderung sowie tatsächliche Selbstkonzeptveränderung und replizieren damit frühere Befunde. Zudem hatte negatives Feedback über die Studien hinweg einen größeren Einfluss auf die (Bereitschaft zur) Selbstkonzeptveränderung als positives Feedback. Somit erweitert die aktuelle Forschung unser Wissen über die Bedingungen, unter denen ein Negativity Bias auftreten kann. Manuskript 1 beinhaltet zudem einen ersten, indirekten Test des vorgeschlagenen Erklärungsansatzes für die unterschiedlichen Befundmuster zu positivem und negativem Feedback, der die Rolle von Motiven für Self-Improvement und Self-Enhancement in den Fokus nimmt. Dieser konnte die inkonsistenten Ergebnisse bisheriger Forschung nicht erklären.

Manuskript 2 beschäftigt sich mit der Rolle von Reflexion bei Feedback-induzierter Selbstkonzeptveränderung. Reflexion wird als eine Form von selbstbezogener Aufmerksamkeit betrachtet (Morin & Racy, 2021; Trapnell & Campbell, 1999), bei der unter anderem neue Informationen mit den existierenden Überzeugungen verglichen und in die bestehenden Überzeugungen integriert werden können (Rogers, 2001). Theoretische Ansätze nehmen daher an, dass Reflexion eine wichtige Rolle für Selbstkonzeptveränderung spielt: In einem Reflexionsprozess könnten selbstrelevante Informationen wie diskrepantes Feedback mit den bestehenden Selbsteinschätzungen verglichen werden und zu Veränderungen in den Selbsteinschätzungen führen (Wrzus & Roberts, 2017). Der Zusammenhang zwischen Reflexion und Veränderungen in Selbsteinschätzungen wurde bisher allerdings in wenigen Studien quantitativ untersucht und vorhandene Forschungsarbeiten haben keine starke

Evidenz dafür gefunden (Quintus et al., 2021). In Manuskript 2 habe ich daher den Zusammenhang zwischen Reflexion und Selbstkonzeptveränderung in Reaktion auf Feedback untersucht. Zudem habe ich untersucht, ob dieser Zusammenhang nach negativem Feedback stärker ist als nach positivem Feedback: Da negative Informationen für das Selbst bedrohlich sein können (Hakmiller, 1966), könnten diese zu defensiven Reaktionen führen. Ausführliche Reflexion könnte besonders wichtig sein, um solchen Reaktionen entgegenzuwirken. Die Studien in Manuskript 2 zeigten den erwarteten positiven Zusammenhang von Reflexion und Selbstkonzeptveränderung. Dieser waren allerdings nur teilweise stärker nach negativem als nach positivem Feedback.

Manuskript 3 beschäftigt sich mit einem methodischen Artefakt, das möglicherweise bei Studien zum Effekt von Feedback auf Selbstkonzeptveränderung auftreten könnte. In solchen Studien—so auch in den Manuskripten 1 und 2—werden häufig Studiendesigns verwendet, in denen die Versuchsteilnehmenden via Selbstbericht zu zwei Zeitpunkten ihre Selbsteinschätzungen bezüglich bestimmter Domänen des Selbstkonzepts angeben sollen: einmal bevor und einmal nachdem sie Feedback zu diesen Domänen erhalten (z.B. Bosch & Wilbert, 2023; Koban et al., 2017; Korn et al., 2012; Kube et al., 2022; Müller-Pinzler et al., 2019). Unterschiede in den beiden Selbsteinschätzungen werden dann als Veränderungen im Selbstkonzept interpretiert, könnten allerdings auch methodische Artefakte widerspiegeln: Die wiederholte Abfrage der Selbsteinschätzungen könnte von Versuchsteilnehmenden als Hinweisreiz auf die Hypothese der Forschenden verstanden werden und dazu führen, dass die Teilnehmenden ihre Antworten im Rahmen der Studie anpassen (d.h. sie könnte *Demand Effects* erzeugt haben; Coles, Gaertner, et al., 2023; Orne, 1962). Forschung hat gezeigt, dass Versuchsteilnehmende ihre Antworten im Durchschnitt so anpassen, dass sie konsistent mit der vermuteten Hypothese der Forschenden sind (Coles, Wyatt, et al., 2023). Allerdings könnten die Teilnehmenden ihre Antworten auch in die entgegengesetzte Richtung oder gar nicht anpassen (Rosnow & Aiken, 1973; Weber & Cook, 1972). Das Risiko für Demand Effects könnte weiterhin erhöht sein, wenn die Teilnehmenden stark

diskrepantes Feedback erhalten, das einen noch salienteren Hinweisreiz auf die mögliche Hypothese der Forschenden darstellen könnte. Die mögliche Rolle von Demand Effects wurde in Studien zu Selbstkonzeptveränderung nach diskrepantem Feedback zwar diskutiert (z.B. Kube, Rief, et al., 2019; Tao et al., 2025), bisher allerdings nicht empirisch untersucht. Die Befunde aus Manuskript 3 legen nahe, dass Feedback-induzierte Selbstkonzeptveränderung und der Effekt der Größe der Diskrepanz nicht nur Demand Effects widerspiegeln. Demand Effects spielten nur unter spezifischen Bedingungen eine Rolle, und zwar insbesondere dann, wenn die Teilnehmenden hoch motiviert waren, zur Bestätigung oder Widerlegung der vermuteten Hypothese der Forschenden beizutragen.

Zusammenfassend zeigen die Befunde, dass Feedback als wichtige Quelle selbstbezogener Informationen zu (kurzfristigen) Veränderungen im Selbstkonzept führen kann. Basierend auf theoretischen Ansätzen zum Selbstkonzept, zum Umgang mit erwartungsdiskrepanten Informationen und zu den dahinterliegenden Mechanismen erweitert das vorliegende Forschungsprogramm das aktuelle Wissen darüber, wann und warum Feedback einen Effekt auf Selbstkonzeptveränderung im Erwachsenenalter hat. Zudem leistet es einen Beitrag zur Frage, wie solche Effekte—insbesondere unter Berücksichtigung potenzieller Demand Effects—untersucht werden können. Das Forschungsprogramm zeigt außerdem verschiedene Ansatzpunkte für zukünftige Forschung zu diskrepanten selbstbezogenen Informationen und Selbstkonzeptveränderung auf. Neben der weiteren Forschung zum Effekt positiven und negativen Feedbacks, zur Rolle von Reflexion und zu Demand Effects in der Untersuchung von Selbstkonzeptveränderung werden insbesondere drei weiterführende Richtungen für zukünftige Forschung hervorgehoben: die Untersuchung verschiedener Reaktionen auf diskrepantes Feedback, die Verbindung der kurz- und langfristigen Perspektiven auf Selbstkonzeptveränderungen und die Erforschung willentlicher Selbstkonzeptveränderung.

Aufgrund der weitreichenden Auswirkungen des Selbstkonzepts auf verschiedene Bereiche des Lebens ist es wünschenswert, ein umfangreiches Verständnis von Selbstkonzeptveränderung zu

erlangen. Mit der vorliegenden Dissertation hoffe ich, einen Beitrag zu diesem Verständnis zu leisten und zeige weiterführende Forschungsstränge auf, die das aktuelle Wissen in diesem Bereich voranbringen können.

11 References[42]

Allemand, M., & Flückiger, C. (2017). Changing personality traits: Some considerations from psychotherapy process-outcome research for intervention efforts on intentional personality change. *Journal of Psychotherapy Integration*, *27*(4), 476–494. https://doi.org/10.1037/int0000094

Allemand, M., & Flückiger, C. (2022). Personality change through digital-coaching interventions. *Current Directions in Psychological Science*, *31*(1), 41–48. https://doi.org/10.1177/09637214211067782

Anseel, F., & Lievens, F. (2009). The mediating role of feedback acceptance in the relationship between feedback and attitudinal and performance outcomes. *International Journal of Selection and Assessment*, *17*(4), 362–376. https://doi.org/10.1111/j.1468-2389.2009.00479.x

Aron, A., Paris, M., & Aron, E. N. (1995). Falling in love: Prospective studies of self-concept change. *Journal of Personality and Social Psychology*, *69*(6), 1102–1112. https://doi.org/10.1037/0022-3514.69.6.1102

Ashford, S. J., & Cummings, L. L. (1983). Feedback as an individual resource: Personal strategies of creating information. *Organizational Behavior and Human Performance*, *32*(3), 370–398. https://doi.org/10.1016/0030-5073(83)90156-3

Back, M. D., Schmukle, S. C., & Egloff, B. (2009). Predicting actual behavior from the explicit and implicit self-concept of personality. *Journal of Personality and Social Psychology*, *97*, 533–548. https://doi.org/10.1037/a0016229

Bang, K.-S., Kim, S., Lee, G., Jeong, Y., Shin, D., & Kim, M. (2022). Intervention studies on the enhancement of self-concept among adolescent mothers: A systematic review. *Journal of*

[42] This reference list includes references for the chapters “Introduction”, “Discussion”, and “Deutsche Zusammenfassung”. References for the manuscripts are displayed in the respective chapters.

Psychosocial Nursing and Mental Health Services, *60*(3), 31–39. https://doi.org/10.3928/02793695-20210819-03

Barnett, M. D., Moore, J. M., & Harp, A. R. (2017). Who we are and how we feel: Self-discrepancy theory and specific affective states. *Personality and Individual Differences*, *111*, 232–237. https://doi.org/10.1016/j.paid.2017.02.024

Bem, D. J. (1972). Self-perception theory. In L. Berkowitz (Ed.), *Advances in Experimental Social Psychology* (Vol. 6, pp. 1–62). Academic Press. https://doi.org/10.1016/S0065-2601(08)60024-6

Bendel, Y., Gesualdo, C., Pinquart, M., & von Blanckenburg, P. (2023). Better than expected? Predictors of coping with expectation violations in the communication about death and dying. *Frontiers in Psychology*, *14:1256202*. https://doi.org/10.3389/fpsyg.2023.1256202

Bergner, R. M. (2025). What is the self-concept? An alternative formulation and therapeutic strategies for change. *Practice Innovations*, Advance online publication. https://doi.org/10.1037/pri0000284

Binderman, R. M., Fretz, B. R., Scott, N. A., & Abrams, M. H. (1972). Effects of interpreter credibility and discrepancy level of results on responses to test results. *Journal of Counseling Psychology*, *19*, 399–403. https://doi.org/10.1037/h0033232

Bleidorn, W., Hopwood, C. J., Back, M. D., Denissen, J. J. A., Hennecke, M., Hill, P. L., Jokela, M., Kandler, C., Lucas, R. E., Luhmann, M., Orth, U., Roberts, B. W., Wagner, J., Wrzus, C., & Zimmermann, J. (2021). Personality trait stability and change. *Personality Science*, *2*, 1–20. https://doi.org/10.5964/ps.6009

Boldero, J. M., Moretti, M. M., Bell, R. C., & Francis, J. J. (2005). Self-discrepancies and negative affect: A primer on when to look for specificity, and how to find it. *Australian Journal of Psychology*, *57*(3), 139–147. https://doi.org/10.1080/00049530500048730

Bosch, J., & Wilbert, J. (2023). The impact of social comparison processes on self-evaluation of performance, self-concept, and task interest. *Frontiers in Education*, *8:1033488*. https://doi.org/10.3389/feduc.2023.1033488

Bracken, D. W., & Rose, D. S. (2011). When does 360-degree feedback create behavior change? And how would we know it when it does? *Journal of Business and Psychology*, *26*(2), 183–192. https://doi.org/10.1007/s10869-011-9218-5

Brandtstädter, J., & Greve, W. (1994). The aging self: Stabilizing and protective processes. *Developmental Review*, *14*(1), 52–80. https://doi.org/10.1006/drev.1994.1003

Brown, H. E., Parker ,Audrey L., Johnson ,Ty K., & and Erekson, D. M. (2024). Me, myself, and I: Therapy and self-concept change in college students. *Journal of College Student Mental Health*, *38*(3), 477–499. https://doi.org/10.1080/87568225.2023.2198154

Casal, S., DellaValle, N., Mittone, L., & Soraperra, I. (2017). Feedback and efficient behavior. *PLOS ONE*, *12*(4), e0175738. https://doi.org/10.1371/journal.pone.0175738

Chen, T.-H., Lu, R.-B., Chang, A.-J., Chu, D.-M., & Chou, K.-R. (2006). The evaluation of cognitive–behavioral group therapy on patient depression and self-esteem. *Archives of Psychiatric Nursing*, *20*(1), 3–11. https://doi.org/10.1016/j.apnu.2005.08.005

Coles, N. A., Gaertner, L., Frohlich, B., Larsen, J. T., & Basnight-Brown, D. M. (2023). Fact or artifact? Demand characteristics and participants' beliefs can moderate, but do not fully account for, the effects of facial feedback on emotional experience. *Journal of Personality and Social Psychology*, *124*(2), 287–310. https://doi.org/10.1037/pspa0000316

Coles, N. A., Wyatt, M., & Frank, M. C. (2023). *A quantitative review of demand characteristics and their underlying mechanisms*. PsyArXiv. https://doi.org/10.31234/osf.io/uw85a

Corsini, R. (2016). *The dictionary of psychology*. Routledge.

Craven, R., Marsh, H., & Burnett, P. (2003). Breaking the self-concept enhancement conundrum: Re-conceptualising the next generation of self-concept enhancement research. In P. L. Jeffery (Ed.), *Proceedings of the New Zealand Association for Research in Education/Australian Association for Research in Education Joint Conference 2003* (pp. 1–20). New Zealand Association for Research in Education/Australian Association for Research in Education Joint Conference 2003, Australia. Australian Association for Research in Education. https://eprints.qut.edu.au/26642/

Cronbach, L. J., & Shapiro, K. (1982). *Designing evaluations of educational and social programs*. Jossey-Bass. https://library.wur.nl/WebQuery/titel/217611

Czekalla, N., Stierand, J., Stolz, D. S., Mayer, A. V., Voges, J. F., Rademacher, L., Paulus, F. M., Krach, S., & Müller-Pinzler, L. (2021). Self-beneficial belief updating as a coping mechanism for stress-induced negative affect. *Scientific Reports*, *11*(1), 17096. https://doi.org/10.1038/s41598-021-96264-0

Der Pan, P. J., Deng, L.-Y. F., Tsai, S. L., Sue, I.-R., & Jiang, J.-R. K. (2014). Effectiveness of an enhancement program on Taiwanese university students' self-concept. *Psychological Reports*, *114*(1), 176–184. https://doi.org/10.2466/07.11.PR0.114k12w2

Dijksterhuis, A. (2004). I like myself but I don't know why: Enhancing implicit self-esteem by subliminal evaluative conditioning. *Journal of Personality and Social Psychology*, *86*(2), 345–355. https://doi.org/10.1037/0022-3514.86.2.345

Duval, S., & Wicklund, R. A. (1972). *A theory of objective self awareness* (pp. x, 238). Academic Press.

Eil, D., & Rao, J. M. (2011). The good news-bad news effect: Asymmetric processing of objective information about yourself. *American Economic Journal: Microeconomics*, *3*(2), 114–138. https://doi.org/10.1257/mic.3.2.114

Elder, J., Davis, T., & Hughes, B. L. (2022). Learning about the self: Motives for coherence and positivity constrain learning from self-relevant social feedback. *Psychological Science*, *33*(4), 629–647. https://doi.org/10.1177/09567976211045934

Ertac, S. (2011). Does self-relevance affect information processing? Experimental evidence on the response to performance and non-performance feedback. *Journal of Economic Behavior & Organization*, *80*(3), 532–545. https://doi.org/10.1016/j.jebo.2011.05.012

Festinger, L. (1957). A theory of cognitive dissonance. *Stanford University Press*.

Findley, M. G., Kikuta, K., & Denly, M. (2021). External validity. *Annual Review of Political Science*, *24*(Volume 24, 2021), 365–393. https://doi.org/10.1146/annurev-polisci-041719-102556

Folkersma, W., Veerman, V., Ornée, D. A., Oldehinkel, A. J., Alma, M. A., & Bastiaansen, J. A. (2021). Patients' experience of an ecological momentary intervention involving self-monitoring and personalized feedback for depression. *Internet Interventions*, *26*, 100436. https://doi.org/10.1016/j.invent.2021.100436

Gallrein, A.-M. B., Bollich-Ziegler, K. L., & Leising, D. (2019). Interpersonal feedback in everyday life: Empirical studies in Germany and the United States. *European Journal of Social Psychology*, *49*(1), 1–18. https://doi.org/10.1002/ejsp.2381

García-Arch, J., Friedrich, S., Wu, X., Cucurell, D., & Fuentemilla, L. (2024). Beyond the positivity bias: The processing and integration of self-relevant feedback is driven by its alignment with pre-existing self-views. *Cognitive Science*, *48*(11), e70017. https://doi.org/10.1111/cogs.70017

Gesualdo, C., & Pinquart, M. (2022). Predictors of coping with health-related expectation violations among university students. *American Journal of Health Behavior*, *46*(4), 488–496. https://doi.org/10.5993/AJHB.46.4.9

Gibbons, F. X. (1983). Self-attention and self-report: The "veridicality" hypothesis. *Journal of Personality*, *51*(3), 517–542. https://doi.org/10.1111/j.1467-6494.1983.tb00343.x

Glück, J., & Weststrate, N. M. (2022). The wisdom researchers and the elephant: An integrative model of wise behavior. *Personality and Social Psychology Review*, *26*(4), 342–374. https://doi.org/10.1177/10888683221094650

Gore, J. S., & Cross, S. E. (2011). Defining and measuring self-concept change. *Psychological Studies*, *56*(1), 135–141. https://doi.org/10.1007/s12646-011-0067-0

Gore, J. S., & Cross, S. E. (2014). Who am I becoming? A theoretical framework for understanding self-concept change. *Self and Identity*, *13*(6), 740–764. https://doi.org/10.1080/15298868.2014.933712

Graham, E. K., Weston, S. J., Gerstorf, D., Yoneda, T. B., Booth, T., Beam, C. R., Petkus, A. J., Drewelies, J., Hall, A. N., Bastarache, E. D., Estabrook, R., Katz, M. J., Turiano, N. A., Lindenberger, U., Smith, J., Wagner, G. G., Pedersen, N. L., Allemand, M., SpiroIII, A., … Mroczek, D. K. (2020). Trajectories of Big Five personality traits: A coordinated analysis of 16 longitudinal samples. *European Journal of Personality*, *34*(3), 301–321. https://doi.org/10.1002/per.2259

Greenwald, A. G., & Farnham, S. D. (2000). Using the Implicit Association Test to measure self-esteem and self-concept. *Journal of Personality and Social Psychology*, *79*(6), 1022–1038. https://doi.org/10.1037/0022-3514.79.6.1022

Grumm, M., Nestler, S., & Collani, G. von. (2009). Changing explicit and implicit attitudes: The case of self-esteem. *Journal of Experimental Social Psychology*, *45*(2), 327–335. https://doi.org/10.1016/j.jesp.2008.10.006

Guadagno, R. E., & Burger, J. M. (2007). Self-concept clarity and responsiveness to false feedback. *Social Influence*, *2*(3), 159–177. https://doi.org/10.1080/15534510701357270

Guay, F., Marsh, H. W., & Boivin, M. (2003). Academic self-concept and academic achievement: Developmental perspectives on their causal ordering. *Journal of Educational Psychology*, *95*(1), 124–136. https://doi.org/10.1037/0022-0663.95.1.124

Haehner, P., Wright, A. J., & Bleidorn, W. (2024). A systematic review of volitional personality change research. *Communications Psychology*, *2*(1), 1–14. https://doi.org/10.1038/s44271-024-00167-5

Hakmiller, K. L. (1966). Threat as a determinant of downward comparison. *Journal of Experimental Social Psychology*, *1*, 32–39. https://doi.org/10.1016/0022-1031(66)90063-1

Hattie, J. (1992). *Self-concept*. Lawrence Erlbaum Associates, Inc.

Hattie, J., & Timperley, H. (2007). The power of feedback. *Review of Educational Research*, *77*(1), 81–112. https://doi.org/10.3102/003465430298487

Henss, L., & Pinquart, M. (2022). Dispositional and situational predictors of coping with violated achievement expectations. *Quarterly Journal of Experimental Psychology*, *75*(6), 1121–1134. https://doi.org/10.1177/17470218211048108

Henss, L., & Pinquart, M. (2023). Expectations do not need to be accurate to be maintained: Valence and need for cognitive closure predict expectation update vs. persistence. *Frontiers in Psychology*, *14:1127328*. https://doi.org/10.3389/fpsyg.2023.1127328

Henss, L., & Pinquart, M. (2024). Coping with expectation violations in education: The role of optimism bias and need for cognitive closure. *European Journal of Psychology of Education*, *39*(3), 2303–2323. https://doi.org/10.1007/s10212-023-00783-5

Hermsen, S., Frost, J., Renes, R. J., & Kerkhof, P. (2016). Using feedback through digital technology to disrupt and change habitual behavior: A critical review of current literature. *Computers in Human Behavior*, *57*, 61–74. https://doi.org/10.1016/j.chb.2015.12.023

Higgins, E. T. (1987). Self-discrepancy: A theory relating self and affect. *Psychological Review*, *94*(3), 319–340. https://doi.org/10.1037/0033-295X.94.3.319

Higgins, E. T., Bond, R. N., Klein, R., & Strauman, T. (1986). Self-discrepancies and emotional vulnerability: How magnitude, accessibility, and type of discrepancy influence affect. *Journal of Personality and Social Psychology*, *51*(1), 5–15. https://doi.org/10.1037/0022-3514.51.1.5

Hudson, N. W. (2021a). Chapter 50—Dynamics and processes in personality change interventions. In J. F. Rauthmann (Ed.), *The Handbook of Personality Dynamics and Processes* (pp. 1273–1295). Academic Press. https://doi.org/10.1016/B978-0-12-813995-0.00050-9

Hudson, N. W. (2021b). Does successfully changing personality traits via intervention require that participants be autonomously motivated to change? *Journal of Research in Personality*, *95*, 104160. https://doi.org/10.1016/j.jrp.2021.104160

Hudson, N. W., Briley, D. A., Chopik, W. J., & Derringer, J. (2019). You have to follow through: Attaining behavioral change goals predicts volitional personality change. *Journal of Personality and Social Psychology*, *117*(4), 839–857. https://doi.org/10.1037/pspp0000221

Hudson, N. W., Chopik, W. J., & Briley, D. A. (2020). Volitional change in adult attachment: Can people who want to become less anxious and avoidant move closer towards realizing those goals? *European Journal of Personality*, *34*(1), 93–114. https://doi.org/10.1002/per.2226

Hudson, N. W., & Fraley, R. C. (2015). Volitional personality trait change: Can people choose to change their personality traits? *Journal of Personality and Social Psychology*, *109*(3), 490–507. https://doi.org/10.1037/pspp0000021

Hudson, N. W., Fraley, R. C., Chopik, W. J., & Briley, D. A. (2020). Change goals robustly predict trait growth: A mega-analysis of a dozen intensive longitudinal studies examining volitional change. *Social Psychological and Personality Science*, *11*(6), 723–732. https://doi.org/10.1177/1948550619878423

Hudson, N. W., & Roberts, B. W. (2014). Goals to change personality traits: Concurrent links between personality traits, daily behavior, and goals to change oneself. *Journal of Research in Personality*, *53*, 68–83. https://doi.org/10.1016/j.jrp.2014.08.008

Huflejt-Łukasik, M., Bąk, W., Styła, R., & Klajs, K. (2015). Changes in the self in the course of psychotherapy. *Annals of Psychology*, *18*(3), 449–464. https://doi.org/10.18290/rpsych.2015.18.3-6en

Judge, T. A., & Hurst, C. (2008). How the rich (and happy) get richer (and happier): Relationship of core self-evaluations to trajectories in attaining work success. *Journal of Applied Psychology*, *93*(4), 849–863. https://doi.org/10.1037/0021-9010.93.4.849

Kandler, C., Kornadt, A. E., Hagemeyer, B., & Neyer, F. J. (2015). Patterns and sources of personality development in old age. *Journal of Personality and Social Psychology*, *109*(1), 175–191. https://doi.org/10.1037/pspp0000028

Kirchner, L., Kube, T., D'Astolfo, L., Strahler, J., Herbstreit, R., & Rief, W. (2023). How to modify expectations of social rejection? An experimental study using a false-feedback paradigm. *Journal of Behavior Therapy and Experimental Psychiatry*, *81*, 101859. https://doi.org/10.1016/j.jbtep.2023.101859

Koban, L., Schneider, R., Ashar, Y. K., Andrews-Hanna, J. R., Landy, L., Moscovitch, D. A., Wager, T. D., & Arch, J. J. (2017). Social anxiety is characterized by biased learning about performance and the self. *Emotion*, *17*(8), 1144–1155. https://doi.org/10.1037/emo0000296

Korn, C. W., Fan, Y., Zhang, K., Wang, C., Han, S., & Heekeren, H. R. (2014). Cultural influences on social feedback processing of character traits. *Frontiers in Human Neuroscience*, *8:192*. https://doi.org/10.3389/fnhum.2014.00192

Korn, C. W., Prehn, K., Park, S. Q., Walter, H., & Heekeren, H. R. (2012). Positively biased processing of self-relevant social feedback. *Journal of Neuroscience*, *32*(47), 16832–16844. https://doi.org/10.1523/JNEUROSCI.3016-12.2012

Korn, C. W., Rosée, L. L., Heekeren, H. R., & Roepke, S. (2016). Social feedback processing in borderline personality disorder. *Psychological Medicine*, *46*(3), 575–587. https://doi.org/10.1017/S003329171500207X

Krach, S., Müller-Pinzler, L., Czekalla, N., Schröder, A., Wilhelm-Groch, I., Luebber, F., Rademacher, L., Stolz, D., Paulus, F. M., & Mayer, A. V. (2024). *Self-belief formation*. PsyArXiv. https://doi.org/10.31234/osf.io/2y5tv

Kube, T., & Eggers, I. W. T. (2025). How the discrepancy between expectation and outcome influences expectation change in relation to depressive symptoms – Results from four experimental studies. *Journal of Affective Disorders*, *380*, 666–684. https://doi.org/10.1016/j.jad.2025.03.167

Kube, T., & Glombiewski, J. A. (2021). How depressive symptoms hinder positive information processing: An experimental study on the interplay of cognitive immunisation and negative mood in the context of expectation adjustment. *Cognitive Therapy and Research*, *45*(3), 517–528. https://doi.org/10.1007/s10608-020-10191-4

Kube, T., & Glombiewski, J. A. (2022). No evidence for the involvement of cognitive immunisation in updating beliefs about the self in three non-clinical samples. *Cognitive Therapy and Research*, *46*(1), 43–61. https://doi.org/10.1007/s10608-021-10256-y

Kube, T., Glombiewski, J. A., Gall, J., Touissant, L., Gärtner, T., & Rief, W. (2019). How to modify persisting negative expectations in major depression? An experimental study comparing three strategies to inhibit cognitive immunization against novel positive experiences. *Journal of Affective Disorders*, *250*, 231–240. https://doi.org/10.1016/j.jad.2019.03.027

Kube, T., Kirchner, L., Lemmer, G., & Glombiewski, J. A. (2022). How the discrepancy between prior expectations and new information influences expectation updating in depression—The greater, the better? *Clinical Psychological Science*, *10*(3), 430–449. https://doi.org/10.1177/21677026211024644

Kube, T., Rief, W., Gollwitzer, M., Gärtner, T., & Glombiewski, J. A. (2019). Why dysfunctional expectations in depression persist – Results from two experimental studies investigating cognitive immunization. *Psychological Medicine*, *49*(9), 1532–1544. https://doi.org/10.1017/S0033291718002106

Kuster, F., & Orth, U. (2013). The long-term stability of self-esteem: Its time-dependent decay and nonzero asymptote. *Personality and Social Psychology Bulletin*, *39*(5), 677–690. https://doi.org/10.1177/0146167213480189

Leary, M. R. (2007). Motivational and emotional aspects of the self. *Annual Review of Psychology*, *58*(Volume 58, 2007), 317–344. https://doi.org/10.1146/annurev.psych.58.110405.085658

London, M. (2003). *Job feedback: Giving, seeking, and using feedback for performance improvement* (2nd ed.). Psychology Press. https://doi.org/10.4324/9781410608871

Luo, R., Tamis-LeMonda, C. S., & Song, L. (2013). Chinese parents' goals and practices in early childhood. *Early Childhood Research Quarterly*, *28*(4), 843–857. https://doi.org/10.1016/j.ecresq.2013.08.001

Markus, H. R., & Kitayama, S. (1991). Culture and the self: Implications for cognition, emotion, and motivation. *Psychological Review*, *98*(2), 224–253. https://doi.org/10.1037/0033-295X.98.2.224

Marsh, H. W. (1990). A multidimensional, hierarchical model of self-concept: Theoretical and empirical justification. *Educational Psychology Review*, *2*(2), 77–172. https://doi.org/10.1007/BF01322177

Marsh, H. W. (2008). A multidimensional, hierarchical model of self-concept: An important facet of personality. In *The SAGE Handbook of Personality Theory and Assessment* (Vol. 1, pp. 447–469). Sage. https://www.torrossa.com/en/resources/an/4913722

Marsh, H. W., Byrne, B. M., & Shavelson, R. J. (1988). A multifaceted academic self-concept: Its hierarchical structure and its relation to academic achievement. *Journal of Educational Psychology*, *80*(3), 366–380. https://doi.org/10.1037/0022-0663.80.3.366

Marsh, H. W., & Martin, A. J. (2011). Academic self-concept and academic achievement: Relations and causal ordering. *British Journal of Educational Psychology*, *81*(1), 59–77. https://doi.org/10.1348/000709910X503501

Mason, T. B., Smith, K. E., Engwall, A., Lass, A., Mead, M., Sorby, M., Bjorlie, K., Strauman, T. J., & Wonderlich, S. (2019). Self-discrepancy theory as a transdiagnostic framework: A meta-analysis of self-discrepancy and psychopathology. *Psychological Bulletin*, *145*(4), 372–389. https://doi.org/10.1037/bul0000186

McAdams, D. P., & McLean, K. C. (2013). Narrative identity. *Current Directions in Psychological Science*, *22*(3), 233–238. https://doi.org/10.1177/0963721413475622

McConnell, A. R., Rydell, R. J., & Brown, C. M. (2009). On the experience of self-relevant feedback: How self-concept organization influences affective responses and self-evaluations. *Journal of Experimental Social Psychology*, *45*(4), 695–707. https://doi.org/10.1016/j.jesp.2009.03.011

McKinley, N. M. (2006). Longitudinal gender differences in objectified body consciousness and weight-related attitudes and behaviors: Cultural and developmental contexts in the transition from college. *Sex Roles*, *54*(3), 159–173. https://doi.org/10.1007/s11199-006-9335-1

Miller, J. P. (2020). Finding truth within: Exploring the importance of reflective practice in deepening self-knowledge. *Integral Review*, *16*(1), 357–390.

Möbius, M. M., Niederle, M., Niehaus, P., & Rosenblat, T. S. (2022). Managing self-confidence: Theory and experimental evidence. *Management Science*, *68*(11), 7793–7817. https://doi.org/10.1287/mnsc.2021.4294

Morin, A. (2011). Self-awareness part 1: Definition, measures, effects, functions, and antecedents. *Social and Personality Psychology Compass*, *5*(10), 807–823. https://doi.org/10.1111/j.1751-9004.2011.00387.x

Morin, A., & Racy, F. (2021). Chapter 15—Dynamic self-processes. In J. F. Rauthmann (Ed.), *The Handbook of Personality Dynamics and Processes* (pp. 365–386). Academic Press. https://doi.org/10.1016/B978-0-12-813995-0.00015-7

Müller-Pinzler, L., Czekalla, N., Mayer, A. V., Stolz, D. S., Gazzola, V., Keysers, C., Paulus, F. M., & Krach, S. (2019). Negativity-bias in forming beliefs about own abilities. *Scientific Reports*, *9*(1), 14416. https://doi.org/10.1038/s41598-019-50821-w

Mummendey, H. D. (1988). Veränderung von Selbstkonzepten. In *Verhalten und Einstellung* (pp. 73–98). Springer, Berlin, Heidelberg. https://doi.org/10.1007/978-3-642-73549-3_4

Mummendey, H. D. (2006). *Psychologie des "Selbst": Theorien, Methoden und Ergebnisse der Selbstkonzeptforschung*. Hogrefe.

Mummendey, H. D., & Sturm, G. (1982). *Eine fünfjährige Längsschnittuntersuchung zu Selbstbildänderungen jüngerer Erwachsener und zum Einfluss kritischer Lebensereignisse* (Bielefelder Arbeiten Zur Sozialpsychologie). Universitaet Bielefeld, Fakultaet fuer Soziologie. https://nbn-resolving.org/urn:nbn:de:0070-bipr-32855

Niveau, N., New, B., & Beaudoin, M. (2021). Self-esteem interventions in adults – A systematic review and meta-analysis. *Journal of Research in Personality*, *94*, 104131. https://doi.org/10.1016/j.jrp.2021.104131

Olaru, G., van Scheppingen, M. A., Stieger, M., Kowatsch, T., Flückiger, C., & Allemand, M. (2023). The effects of a personality intervention on satisfaction in 10 domains of life: Evidence for increases and correlated change with personality traits. *Journal of Personality and Social Psychology*, *125*(4), 902–924. https://doi.org/10.1037/pspp0000474

O'Mara, A. J., Marsh, H. W., Craven, R. G., & Debus, R. L. (2006). Do Self-Concept Interventions Make a Difference? A Synergistic Blend of Construct Validation and Meta-Analysis. *Educational Psychologist*, *41*(3), 181–206. https://doi.org/10.1207/s15326985ep4103_4

O'Mara, A. J., Marsh ,Herbert W., Craven ,Rhonda G., & and Debus, R. L. (2006). Do self-concept interventions make a difference? A synergistic blend of construct validation and meta-analysis. *Educational Psychologist*, *41*(3), 181–206. https://doi.org/10.1207/s15326985ep4103_4

Orne, M. T. (1962). *On the social psychology of the psychological experiment: With particular reference to demand characteristics and their implications*. *17*(11), 776–783. https://doi.org/10.1037/h0043424

Orphal, L., & Pinquart, M. (2025). Coping with failures: How emotions, individual traits, expectation-importance and prior experience affect reactions to violated achievement expectations. *Frontiers in Psychology*, *16*, 1506051. https://doi.org/10.3389/fpsyg.2025.1506051

Orth, U., Dapp, L. C., Erol, R. Y., Krauss, S., & Luciano, E. C. (2021). Development of domain-specific self-evaluations: A meta-analysis of longitudinal studies. *Journal of Personality and Social Psychology*, *120*(1), 145–172. https://doi.org/10.1037/pspp0000378

Orth, U., & Robins, R. W. (2014). The development of self-esteem. *Current Directions in Psychological Science*, *23*(5), 381–387. https://doi.org/10.1177/0963721414547414

Orth, U., Robins, R. W., & Roberts, B. W. (2008). Low self-esteem prospectively predicts depression in adolescence and young adulthood. *Journal of Personality and Social Psychology*, *95*(3), 695–708. https://doi.org/10.1037/0022-3514.95.3.695

Orth, U., Robins, R. W., & Widaman, K. F. (2012). Life-span development of self-esteem and its effects on important life outcomes. *Journal of Personality and Social Psychology*, *102*(6), 1271–1288. https://doi.org/10.1037/a0025558

Pals, J. L. (2006). Narrative identity processing of difficult life experiences: Pathways of personality development and positive self-transformation in adulthood. *Journal of Personality*, *74*(4), 1079–1110. https://doi.org/10.1111/j.1467-6494.2006.00403.x

Panitz, C., Endres, D., Buchholz, M., Khosrowtaj, Z., Sperl, M. F. J., Mueller, E. M., Schubö, A., Schütz, A. C., Teige-Mocigemba, S., & Pinquart, M. (2021). A revised framework for the investigation of expectation update versus maintenance in the context of expectation violations: The ViolEx 2.0 model. *Frontiers in Psychology*, *12:726432*. https://doi.org/10.3389/fpsyg.2021.726432

Perugini, M., Hagemeyer, B., Wrzus, C., & Back, M. D. (2021). Chapter 20—Dual process models of personality. In J. F. Rauthmann (Ed.), *The Handbook of Personality Dynamics and Processes* (pp. 551–577). Academic Press. https://doi.org/10.1016/B978-0-12-813995-0.00020-0

Petrocelli, J. V., & Smith, E. R. (2005). Who I am, who we are, and why: Links between emotions and causal attributions for self- and group discrepancies. *Personality and Social Psychology Bulletin*, *31*(12), 1628–1642. https://doi.org/10.1177/0146167205277390

Pfabigan, D. M., Wucherer, A. M., Wang, X., Pan, X., Lamm, C., & Han, S. (2018). Cultural influences on the processing of social comparison feedback signals—An ERP study. *Social Cognitive and Affective Neuroscience*, *13*(12), 1317–1326. https://doi.org/10.1093/scan/nsy097

Pietzsch, M. C., & Pinquart, M. (2023). Predicting coping with expectation violations: Combining the ViolEx model and the covariation principle. *Frontiers in Psychology*, *14, 1152261*. https://doi.org/10.3389/fpsyg.2023.1152261

Pinquart, M., Rothers, A., Gollwitzer, M., Khosrowtaj, Z., Pietzsch, M., & Panitz, C. (2021). Predictors of coping with expectation violation: An integrative review. *Review of General Psychology*, *25*(3), 321–333. https://doi.org/10.1177/10892680211024123

Quintus, M., Egloff, B., & Wrzus, C. (2021). Daily life processes predict long-term development in explicit and implicit representations of Big Five traits: Testing predictions from the TESSERA (triggering situations, expectancies, states and state expressions, and reactions) framework. *Journal of Personality and Social Psychology*, *120*(4), 1049–1073. https://doi.org/10.1037/pspp0000361

Rief, W., Glombiewski, J. A., Gollwitzer, M., Schubö, A., Schwarting, R., & Thorwart, A. (2015). Expectancies as core features of mental disorders. *Current Opinion in Psychiatry*, *28*(5), 378–385. https://doi.org/10.1097/YCO.0000000000000184

Roberts, B. W., & Caspi, A. (2003). The cumulative continuity model of personality development: Striking a balance between continuity and change in personality traits across the life course. In U. M. Staudinger & U. Lindenberger (Eds.), *Understanding Human Development: Dialogues with Lifespan Psychology* (pp. 183–214). Springer US. https://doi.org/10.1007/978-1-4615-0357-6_9

Roepke, S., Schröder-Abé, M., Schütz, A., Jacob, G., Dams, A., Vater, A., Rüter, A., Merkl, A., Heuser, I., & Lammers, C.-H. (2011). Dialectic behavioural therapy has an impact on self-concept clarity and facets of self-esteem in women with borderline personality disorder. *Clinical Psychology & Psychotherapy*, *18*(2), 148–158. https://doi.org/10.1002/cpp.684

Rogers, R. R. (2001). Reflection in higher education: A concept analysis. *Innovative Higher Education*, *26*(1), 37–57. https://doi.org/10.1023/A:1010986404527

Rosnow, R. L., & Aiken, L. S. (1973). Mediation of artifacts in behavioral research. *Journal of Experimental Social Psychology*, *9*(3), 181–201. https://doi.org/10.1016/0022-1031(73)90009-7

Saxton, J., Rodda, S. N., Booth, N., Merkouris, S. S., & Dowling, N. A. (2021). The efficacy of Personalized Normative Feedback interventions across addictions: A systematic review and meta-analysis. *PLOS ONE*, *16*(4), e0248262. https://doi.org/10.1371/journal.pone.0248262

Schafer, R. B., & Keith, P. M. (1999). Change in adult self-esteem: A longitudinal assessment. *British Journal of Social Psychology*, *38*(3), 303–314. https://doi.org/10.1348/014466699164185

Schembre, S. M., Liao, Y., Robertson, M. C., Dunton, G. F., Kerr, J., Haffey, M. E., Burnett, T., Basen-Engquist, K., & Hicklen, R. S. (2018). Just-in-time feedback in diet and physical activity interventions: Systematic review and practical design framework. *Journal of Medical Internet Research*, *20*(3), e106. https://doi.org/10.2196/jmir.8701

Sedikides, C., & Strube, M. J. (1997). Self-evaluation: To thine own self be good, to thine own self be sure, to thine own self be true, and to thine own self be better. In M. P. Zanna (Ed.), *Advances in Experimental Social Psychology* (Vol. 29, pp. 209–269). Academic Press. https://doi.org/10.1016/S0065-2601(08)60018-0

Shaikh, A. (2018). Group therapy for improving self-esteem and social functioning of college students with ADHD. *Journal of College Student Psychotherapy*, *32*(3), 220–241. https://doi.org/10.1080/87568225.2017.1388755

Sharot, T., & Garrett, N. (2016). Forming Beliefs: Why Valence Matters. *Trends in Cognitive Sciences*, *20*(1), 25–33. https://doi.org/10.1016/j.tics.2015.11.002

Shavelson, R. J., Hubner, J. J., & Stanton, G. C. (1976). Self-concept: Validation of construct interpretations. *Review of Educational Research*, *46*(3), 407–441. https://doi.org/10.3102/00346543046003407

Silvia, P. J., & Duval, T. S. (2001). Objective self-awareness theory: Recent progress and enduring problems. *Personality and Social Psychology Review*, *5*(3), 230–241. https://doi.org/10.1207/S15327957PSPR0503_4

Straub, L. M., Lin, E., Tremonte-Freydefont, L., & Schmid, P. C. (2023). Individuals' power determines how they respond to positive versus negative performance feedback. *European Journal of Social Psychology*, *53*(7), 1402–1420. https://doi.org/10.1002/ejsp.2985

Stürmer, S. (2009). *Sozialpsychologie*. Ernst Reinhardt (UTB).

Styła, R. (2015). Shape of the self-concept clarity change during group psychotherapy predicts the outcome: An empirical validation of the theoretical model of the self-concept change. *Frontiers in Psychology*, *6:1598*. https://doi.org/10.3389/fpsyg.2015.01598

Suls, J., & Wheeler, L. (2012). Social comparison theory. In P. Van Lange, A. Kruglanski, & E. Higgins (Eds.), *Handbook of theories of social psychology* (Vol. 1, pp. 460–482). Sage Publications Ltd. https://doi.org/10.4135/9781446249215.n23

Swann, W. B. (1983). Self-verification: Bringing social reality into harmony with the self. In *Psychological perspectives on the self* (Vol. 2, pp. 33–66). Erlbaum.

Swann, W. B., & Hill, C. A. (1982). When our identities are mistaken: Reaffirming self-conceptions through social interaction. *Journal of Personality and Social Psychology*, *43*, 59–66. https://doi.org/10.1037/0022-3514.43.1.59

Swann, W. B., & Read, S. J. (1981). Acquiring self-knowledge: The search for feedback that fits. *Journal of Personality and Social Psychology*, *41*(6), 1119–1128. https://doi.org/10.1037/0022-3514.41.6.1119

Tao, R., Zhang, H., Geng, L., Li, Y., & Qiu, J. (2025). The Influence of Trait and State Creative Self-Efficacy on Creative Behavior: An Experimental Study Using False Feedback. *Behavioral Sciences*, *15*(1), 18. https://doi.org/10.3390/bs15010018

Trapnell, P. D., & Campbell, J. D. (1999). Private self-consciousness and the five-factor model of personality: Distinguishing rumination from reflection. *Journal of Personality and Social Psychology*, *76*(2), 284–304. https://doi.org/10.1037/0022-3514.76.2.284

Unkelbach, C., Alves, H., & Koch, A. (2020). Chapter Three - Negativity bias, positivity bias, and valence asymmetries: Explaining the differential processing of positive and negative information. In B. Gawronski (Ed.), *Advances in experimental social psychology* (Vol. 62, pp. 115–187). Academic Press. https://doi.org/10.1016/bs.aesp.2020.04.005

Van der Aar, L. P. E., Peters, S., Becht, A. I., & Crone, E. A. (2022). Better self-concept, better future choices? Behavioral and neural changes after a naturalistic self-concept training program for

adolescents. *Cognitive, Affective, & Behavioral Neuroscience*, *22*(2), 341–361. https://doi.org/10.3758/s13415-021-00946-1

Villano, W. J., Kraus, N. I., Reneau, T. R., Jaso, B. A., Otto, A. R., & Heller, A. S. (2023). Individual differences in naturalistic learning link negative emotionality to the development of anxiety. *Science Advances*, *9*(1), eadd2976. https://doi.org/10.1126/sciadv.add2976

Weber, S. J., & Cook, T. D. (1972). Subject effects in laboratory research: An examination of subject roles, demand characteristics, and valid inference. *Psychological Bulletin*, *77*(4), 273–295. https://doi.org/10.1037/h0032351

Will, G.-J., Rutledge, R. B., Moutoussis, M., & Dolan, R. J. (2017). Neural and computational processes underlying dynamic changes in self-esteem. *ELife*, *6*, e28098. https://doi.org/10.7554/eLife.28098

Wrzus, C. (2021). Processes of personality development: An update of the TESSERA framework. In J. F. Rauthmann (Ed.), *The Handbook of Personality Dynamics and Processes* (pp. 101–123). Elsevier. https://doi.org/10.1016/B978-0-12-813995-0.00005-4

Wrzus, C., & Roberts, B. W. (2017). Processes of personality development in adulthood: The TESSERA framework. *Personality and Social Psychology Review*, *21*(3), 253–277. https://doi.org/10.1177/1088868316652279

Yarcheski, A., Mahon, N. E., Yarcheski, T. J., & Cannella, B. L. (2004). A meta-analysis of predictors of positive health practices. *Journal of Nursing Scholarship*, *36*(2), 102–108. https://doi.org/10.1111/j.1547-5069.2004.04021.x

Zamfir, E., & Dayan, P. (2022). Interactions between attributions and beliefs at trial-by-trial level: Evidence from a novel computer game task. *PLOS Computational Biology*, *18*(9), e1009920. https://doi.org/10.1371/journal.pcbi.1009920

12 Appendix

Overview of Studies and Regression Analysis Results for Size and Direction of Discrepancy Predicting (Intentions for) Self-Concept Change

	Study I		Study II		Study III		Study IV		Study V		Study VI		Study VII		Study VIII		Study IX	
Location in Manuscript(s)	Manuscript 1, Study 1		Manuscript 1, Study 2; Manuscript 2, Study 1e		Manuscript 1, Study 3		Manuscript 1, Study 4; Manuscript 2, Study 1d		Manuscript 2, Study 1a; Manuscript 3, Study 1		Manuscript 2, Study 1b		Manuscript 2, Study 1c		Manuscript 2, Study 2		Manuscript 3, Study 2	
Self-Concept Domain Targeted by Feedback	Various		Spatio-visual thinking		Emotion recognition		Emotion recognition		Weight estimation		Health-consciousness of lifestyle		General knowledge		Procedural thinking		Visual memory	
Regression Analysis Results[a]	*B*	sr^2	*B*	sr^2	*B*	sr^2	*B*	sr^2	*B*	sr^2	*B*	sr^2	*B*	sr^2	*B*	sr^2	*B*	sr^2
Intercept	0.22**		0.00		0.10		0.20**		-0.06		0.13**		0.04		-0.05		0.10	
Size of Discrepancy (SoD)	0.17**	.02	0.26**	.07	0.29**	.04	0.41**	.10	0.59**	.07	0.73**	.18	0.59**	.34	0.35**	.05	0.67**	.13
Direction of Discrepancy (DoD)	-0.35**	.09	-0.22**	.05	-0.17**	.02	-0.40**	.13	-0.11	.00	-0.18**	.02	-0.15**	.02	-0.09*	.00	-0.14*	.01
SoD x DoD	0.28**	.06	-0.04	.00	-0.09	.00	-0.33**	.06	0.02	.00	-0.26**	.02	-0.08*	.01	-0.01	.00	-0.08	.00

Note. [a]Regression analyses included size and direction of discrepancy as well as their interaction as predictors of intentions for self-concept change (Study I) and absolute self-concept change (all other studies). Due to differences in the analyses, the results reported here can differ from those reported in the manuscripts. Values of SoD and the respective dependent variable were standardized on the sample mean and standard deviation for all analyses. DoD: negative = −1, positive = 1. *B* represents unstandardized regression weights. sr^2 represents the squared semipartial correlation.
* indicates $p < .05$. ** indicates $p < .01$.