Dispositional and Situational Predictors of Coping with Expectation Violations: Experimental Studies on the ViolEx Model

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1. Summary

1.1 Abstract

Expectations are cognitions that are formed from past experiences, influence current behavior, and anticipate future events (Roese & Sherman, 2007). Thus, expectations should be accurate in order to effectively guide behavior (Panitz et al., 2021). However, some events cannot be predicted with certainty and predictions are therefore sometimes inaccurate. In particular, educational expectations are often over-optimistic and thus prone to expectation violations (Carolan, 2017). According to the ViolEx model, situation-specific expectations arise from general assumptions, such as the academic self-concept. If the outcome of a situation violates expectations, individuals may cope differently. Coping can trigger anticipatory responses such as assimilation (behavior is directed toward confirming expectations in the future), or it can lead to immunization (denial, devaluation, or ignoring expectation violations) or accommodation (expectation change/destabilization; Gollwitzer et al., 2018; Panitz et al., 2021). Whether expectations are maintained or changed depends strongly on the costs and benefits of each coping strategy, especially when accurate expectations are opposed to a positive self-concept. Both individual differences in personality and situational characteristics of expectation violation may affect coping (Panitz et al., 2021). With regard to individual differences, there is presumably a cross-situational tendency to respond to expectation violations with a particular coping pattern. Furthermore, individuals with a higher need for cognitive closure (NCC) should prefer unambiguous responses (Kruglanski & Webster, 1996). This leads to a bias in favor of existing knowledge and expectations and thus presumably to stronger expectation persistence despite discrepant evidence (Dijksterhuis et al., 1996). However, individuals with higher NCC should be strongly interested in avoiding future expectation violations, so coping tendencies are probably strongly related to situational characteristics such as the valence of expectation violation. Positive and negative valence of expectation violation previously led to outcomes similar to overoptimistic expectations in educational contexts: positive valence led to more accommodation (emergence of overoptimistic expectations) and negative valence led to more immunization (protection of academic self-concept and persistence of overoptimistic expectations; e.g., Garrett & Sharot, 2017). This optimistic bias may also influence how (un)controllable expectation violations are coped with, whereby higher controllability should lead to stronger assimilation and lower controllability to stronger immunization (Bhanji et al., 2016). Moreover, according to learning theories on the degree of expectation violations, expectations should be changed especially when the deviation from the expectation is particularly significant, whereas stronger immunization should follow when discrepancies are small (Rescorla & Wagner, 1972). The purpose of this dissertation is to extend knowledge

about predictors and their interaction in coping with expectation violations in order to theoretically evaluate the VioIEx model and practically identify risk factors for dysfunctional coping with educational expectations.

To this end, the first study included several dispositional and situational predictors, and $N = 439$ participants received standardized expectation-violating feedback in a word riddle. Our results support the assumption that dispositional preferences predict situational coping, but in addition, we found results contrary to learning theories on the degree of expectation violation, an optimistic bias only for negative valence, and strongly context-dependent effects of NCC, which predicted both assimilation and accommodation. Therefore, in the second study, we examined valence and NCC in more detail, and the results from $N = 268$ participants replicated and extended our previous findings: higher NCC again led to stronger accommodation and assimilation, but only for negative valence of expectation violation. Because our studies found biased coping only for negative valence but not for positive valence, we aimed to better understand the optimistic bias in the third study with case vignettes in $N = 249$ students by including controllability and self-enhancement. Negative valence leads to stronger assimilation when the expectation violation was controllable, and positive valence leads to stronger accommodation when individuals self-enhance.

Our studies confirm that coping with expectation violations strongly depends on dispositional and situational characteristics. Our results show that the protection of academic self-concept and educational expectations is preferred over the accuracy of expectations across different situational circumstances. Thus, there is strong persistence in educational expectations despite disconfirming evidence. This might be adaptive as long as it does not lead to frequent expectation violations in the future and especially as long as the situation is controllable. But results differ for individuals with higher NCC, as they show both stronger assimilation and accommodation. The connection between the two strategies, which is often considered contrary, might have a different meaning in the educational context, representing an adaptive compromise between accurate expectations and a positive self-concept.

1.2 Deutsche Zusammenfassung

Erwartungen sind Kognitionen, die sich aus vergangenen Erfahrungen bilden, gegenwärtiges Verhalten beeinflussen und zukünftige Ereignisse antizipieren (Roese & Sherman, 2007). Somit sollten Erwartungen zutreffend sein, um Verhalten möglichst effektiv zu steuern (Panitz et al., 2021). Manche Ereignisse lassen sich jedoch nicht mit Sicherheit vorhersagen und daher sind Erwartungen teilweise unzutreffend. Insbesondere Bildungserwartungen sind oft überoptimistisch und somit anfällig für Erwartungsverletzungen (Carolan, 2017). Nach dem ViolEx Modell entstehen situationsspezifische Erwartungen aus generellen Annahmen, wie zum Beispiel dem akademischen Selbstkonzept. Stimmt das Ergebnis einer Situation nicht mit den Erwartungen überein, können Individuen unterschiedlich damit umgehen. Coping kann sowohl antizipatorische Reaktionen wie Assimilation (Verhalten wird darauf ausgerichtet, Erwartungen in Zukunft zu bestätigen) auslösen, oder aber zu Immunisierung (Verleugnung, Devaluation, oder Ignorieren von Erwartungsverletzungen) oder Akkommodation (Erwartungsveränderung/-destabilisierung) führen (Gollwitzer et al., 2018; Panitz et al., 2021). Ob Erwartungen beibehalten oder verändert werden hängt stark von den Kosten und dem Nutzen der jeweiligen Coping-Strategie ab, insbesondere wenn akkurate Erwartungen einem positiven Selbstkonzeptes gegenüberstehen. Sowohl individuelle Unterschiede in der Persönlichkeit als auch situationale Unterschiede der Erwartungsverletzung können Bewältigung beeinflussen (Panitz et al., 2021). Hinsichtlich individueller Unterschiede besteht vermutlich eine situationsübergreifende Tendenz, auf Erwartungsverletzungen mit einem bestimmten Coping-Muster zu reagieren. Weiterhin ist anzunehmen, dass Individuen mit einem höheren Bedürfnis nach kognitiver Geschlossenheit (NCC) eindeutige Antworten bevorzugen (Kruglanski & Webster, 1996). Dies führt zu einer Verzerrung zugunsten bestehenden Wissens und Erwartungen und somit vermutlich zu stärkerer Erwartungspersistenz trotz diskrepanter Informationen (Dijksterhuis et al., 1996). Jedoch sind auch Individuen mit höherem NCC daran interessiert, zukünftige Erwartungsverletzungen zu vermeiden, weshalb Copingtendenzen über Situationen hinweg variieren können und stark mit situationalen Charakteristiken wie der Valenz der Erwartungsverletzung zusammenhängen. Positive und negative Valenz der Erwartungsverletzung führte zuvor zu Ergebnissen, die den überoptimistischen Erwartungen im Bildungskontext ähneln: Positive Valenz führte zu mehr Akkommodation (Entstehen überoptimistischer Erwartungen) und negative Valenz führte zu mehr Immunisierung (Schutz des akademischen Selbstkonzepts und Bestehen überoptimistischer Erwartungen; e.g., Garrett & Sharot, 2017). Diese optimistische Verzerrung kann auch beeinflussen, wie mit (un)kontrollierbaren Erwartungsverletzungen umgegangen wird, wobei mit höherer Kontrollierbarkeit stärkere Assimilation und mit niedrigerer Kontrollierbarkeit mehr Immunisierung einhergehen sollte (Bhanji et al., 2016).

Zudem sollten Erwartungen nach gängigen Lerntheorien zum Ausmaß von Erwartungsverletzungen besonders dann verändert werden, wenn die Abweichung von der Erwartung besonders signifikant ist, während bei geringen Diskrepanzen stärkere Immunisierung folgen sollte (Rescorla & Wagner, 1972). In dieser Doktorarbeit soll das Wissen über Prädiktoren und deren Interaktion im Umgang mit Erwartungsverletzungen erweitert werden, um theoretisch das ViolEx Modell zu evaluieren und praktisch Risikofaktoren für einen dysfunktionalen Umgang mit Bildungserwartungen zu erkennen.
In der ersten Studie wurden dazu mehrere dispositionelle und situationale Prädiktoren eingeschlossen, und $N = 439$ Teilnehmende erhielten in einem Wörterrätsel standardisierte, erwartungsverletzende Rückmeldungen. Unsere Ergebnisse unterstützen die Annahme, dass dispositionelle Präferenzen situationales Coping vorhersagen, zudem fanden wir aber Ergebnisse entgegen der Lerntheorien zum Ausmaß der Erwartungsverletzung, eine optimistische Verzerrung nur für negative Valenz, und stark kontextabhängige Effekte von NCC, welches sowohl Assimilation als auch Akkommodation vorhersagte. Daher haben wir in der zweiten Studie Valenz und NCC genauer untersucht, und die Ergebnisse von $N = 268$ Teilnehmenden replizierten und erweiterten unsere vorherigen Erkenntnisse: ein höherer NCC führte erneut zu mehr Akkommodation und Assimilation, aber nur bei negativer Valenz der Erwartungsverletzung. Da die bisherigen Studien optimistische Verzerrungen nur für negative, aber nicht für positive Valenz finden konnten, versuchten wir in der dritten Studie mit Fallvignetten bei $N = 249$ Studierenden durch den Einschluss von Kontrollierbarkeit und Selbstwerterhöhung die optimistische Verzerrung besser zu verstehen. Negative Valenz führte besonders dann zu Erwartungspersistenz, wenn die Erwartungsverletzung unkontrollierbar war und bei positiver Valenz kommt es unter verstärkter Selbstwerterhöhung zu Akkommodation.
Die Studien bestätigen, dass Bewältigung von Erwartungsverletzungen stark von dispositionellen und situationalen Charakteristiken abhängt. Unsere Ergebnisse zeigen, dass im Bildungskontext über verschiedene Situationen hinweg der Schutz des akademischen Selbstkonzepts und der Bildungserwartungen stärker wiegt als die Akkuratheit von Erwartungen. Somit besteht bei Bildungserwartungen trotz gegenteiliger Evidenz durch Assimilation und Immunisierung eine starke Persistenz. Dies kann als adaptiv gesehen werden, so lange es dadurch in Zukunft nicht zu häufigen Erwartungsverletzungen kommt und insbesondere so lange die Situation kontrollierbar ist. Aber bei Vorliegen einer höheren NCC-Disposition zeigen Individuen sowohl mehr Assimilation als auch Akkommodation. Der oft als konträr betrachtete Zusammenhang beider Strategien könnte im Bildungskontext eine andere Bedeutung haben und einen adaptiven Mittelweg zwischen zutreffenden Erwartungen und einem positiven Selbstkonzept darstellen.

2. Theory

2.1 Expectations

Expectations can be understood as future-oriented conditional beliefs about the probabilities of events (Hoorens, 2012, Panitz et al., 2021; Roese & Sherman, 2007). Individuals build expectations from an early age (Pinquart & Block, 2020; Stahl & Feigenson, 2017) to effectively guide their behavior (Panitz et al., 2021). Expectations are a particularly important subgroup of cognitions because they integrate past experiences and anticipated future events to drive present behavior (Roese & Sherman, 2007). Whereas expectations of success increase effort, expectations of failure lead to disengagement (Rasmussen et al., 2006). To hold accurate expectations helps individuals to prepare for future events, cope adaptively with them, affect future outcomes in a presumably desired direction, and impacts present and future well-being (Pinquart, Rothers, et al., 2021; Rief & Glombiewski, 2017; Roese & Sherman, 2007).

But due to their probabilistic nature, expectations can be disconfirmed by future events (Hoorens, 2012; Rief et al., 2015; Roese & Sherman, 2007). Individuals experience expectation violations following a discrepancy between expected and perceived situational outcomes (García Alanis et al., 2023). The processing of expectation violations is crucial for learning and individuals can interpret expectation violations as teaching signals to adapt both expectations and behavior (Pinquart, Endres, et al., 2021).

2.1.1 Educational Expectations

Expectations may be especially at risk of being violated when they refer to educational or academic outcomes. A vast majority of research underlines the conclusion that educational and academic expectations tend to be overly optimistic (Carolan, 2017). The increase in high school college students' academic expectations outpaced the increase in young adults' achievements from the 1970s until the early 2000s (Reynolds & Baird, 2010), less than half of students have accurate expectations about their future test performance (Hacker et al., 2000), and students show a tendency to expect higher degrees than they actually earn (Pinquart & Ebeling, 2020b).

Educational expectations address anticipated future academic achievement (Pinquart & Pietzsch, 2022) and reflect what individuals realistically expect to achieve throughout their educational career (Pinquart & Ebeling, 2020a). Educational expectations are correlates, causes, and consequences of numerous important educational outcomes and behaviors such as achievement and attainment (Carolan, 2017; Muenks et al., 2018; Rosenzweig et al., 2019).

Considering the numerous educational and personal stressors that individuals have to face during their educational career, dealing with educational expectations may be

decisive for success and effort. Educational expectations could be both fairly stable or continuously updated throughout school or university. Past research suggests that although expectation violations can lead to the adjustment of overly optimistic expectations, educational expectations often tend to persist over time despite disconfirming evidence (Pinquart & Pietzsch, 2022).

For many students, educational expectations are highly elaborated and certain, therefore individuals show higher persistence and increased effort even when facing disconfirming evidence (Carolan, 2017; Pinquart & Block, 2020; Pinquart, Rothers, et al., 2021; Roese & Sherman, 2007; Schoon & Ng-Knight, 2017; Spicer et al., 2020). Possible explanations for the resistance to change educational expectations include the unwillingness to alter expectations in ways that are misaligned with the academic self-concept (Carolan, 2017), the importance of social influences supporting prior expectations (e.g., parents, teachers, or peers; Carolan, 2017; Pinquart & Pietzsch, 2022), biased information processing towards integration of positive vs. resistance to negative information (Kube & Rozenkrantz, 2021), or primacy effects of earlier educational expectations that override the diagnostic value of current discrepancies (Carolan, 2017). Nevertheless, educational expectations are not completely resistant to change, and although short-term expectations may be adapted, most individuals nevertheless believe to succeed in the long term (Pinquart & Pietzsch, 2022).

Despite often being not accurate and at risk of being violated, there is overwhelming evidence that holding high and even overly optimistic educational expectations has little downsides (Carolan, 2017; Domina et al., 2011). Past research did not find negative emotional consequences of unrealized expectations (Reynolds & Baird, 2010), and confirmed adaptive consequences such as continued effort even when facing obstacles (Rasmussen et al., 2006), greater positive affect despite failures (Shanahan et al., 2020), and stronger academic effort (Domina et al., 2011). Therefore, Pinquart and Pietzsch (2022) recommended maintaining positive expectations about future educational achievement as long as the benefits of these expectations outweigh their harms.

Nevertheless, although over-optimistic expectations tend to be associated with positive outcomes, they also lead to an increased likelihood of failure due to unmet expectations. Considering that educational success depends on the ability to cope with inevitable negative outcomes or setbacks (Bhanji et al., 2016), individuals need to be both realistic but also positive (Greve & Wentura, 2010).

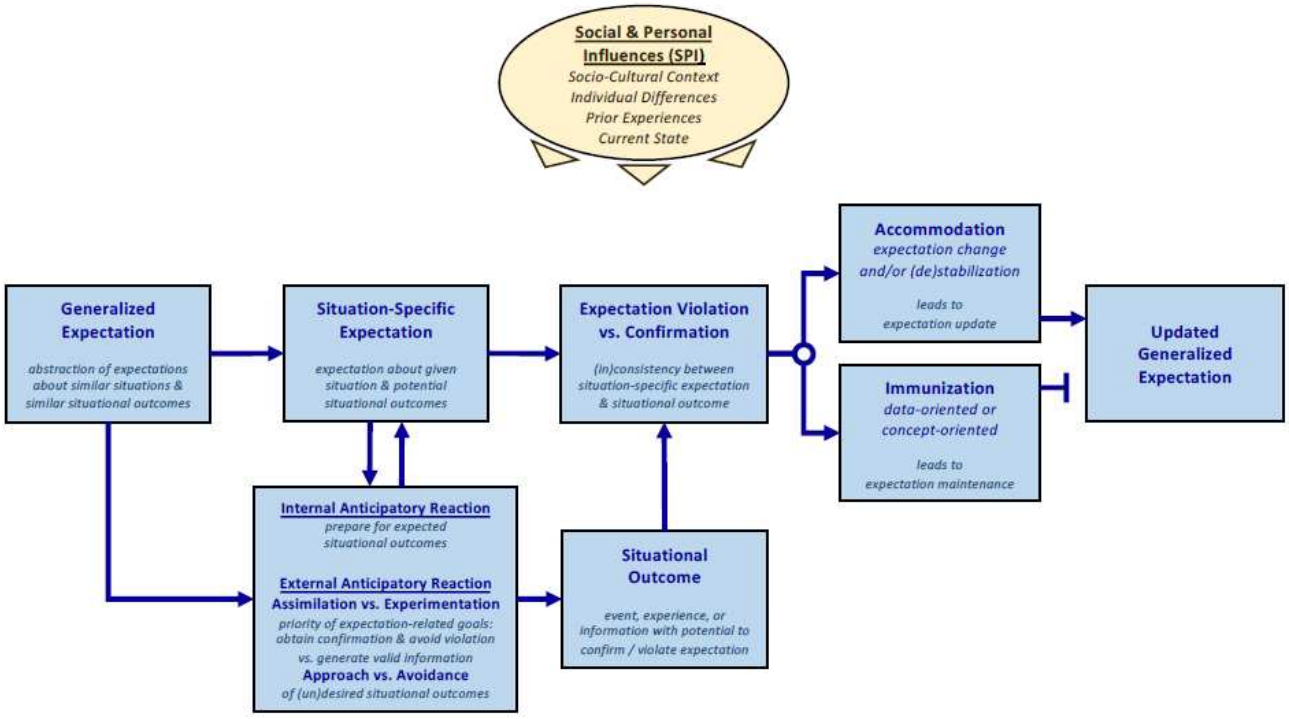
2.2 The Violated Expectations Model (ViolEx Model)

Expectation violations disrupt individuals' predictive ability and lead to physiological arousal, heightened attention, and increasing demands of a situation (Mendes et al., 2007; Pinquart, Endres, et al., 2021). Inconsistencies between any kind of expectations and actual

experiences evoke a state of arousal. Coping with arousal can include both change and maintenance of expectations, and the ViolEx (*Viol*ated *Ex*pectations) model aims to shed light on psychological mechanisms underlying the change vs. maintenance of expectation after facing disconfirming evidence (Gollwitzer et al., 2018).

Based on the phenomenon of maintaining expectations despite disconfirming experiences, a team of researchers developed the ViolEx model, which is intended to be a general framework model explaining how expectations are formed, stabilized, maintained, or changed. The first model by Rief and colleagues from 2015 has since that time been further elaborated by Panitz and colleagues in 2021 (see Figure 1). The ViolEx model refers to all classes of cognitive processes and behavioral responses to expectation violations and has therefore been considered the most complete and versatile model (Panitz et al., 2021). The relatively new ViolEx 2.0 model has so far been applied for example in clinical (Ewen et al., 2023; Kube et al., 2023) and health psychology contexts (Gesualdo & Pinquart, 2022; Gesualdo & Pinquart, 2023).

Figure 1. Level 1 of the ViolEx Model by Panitz et al., 2021, p. 7



The ViolEx model assumes that individuals form generalized expectations through direct or indirect experiences that *type X situations* are followed by *outcome Y*. Generalized expectations refer, for example, to how individuals generally assess the prospects of success in their educational careers according to their academic self-concept. Generalized expectations then lead to situation-specific expectations in appropriate situations, such as an exam (Gollwitzer et al., 2018; Laferton et al., 2017; Panitz et al., 2021; Rief et al., 2015), and tend to induce biased overly optimistic situation-specific outcome expectations. The

situational outcome of an exam can then be both expectation-confirming or expectation-violating, leading to different coping responses.

Coping responses refer to different mechanisms to update vs. maintain expectations (Gollwitzer et al., 2018; Panitz et al., 2021). First, assimilation refers to proactive behavior which increases the probability of expectation confirmation and is considered to be an anticipatory reaction. Assimilation is triggered reactively by situation-specific expectations or proactively by generalized expectations and includes behavior aimed at changing the probabilities of potential situational outcomes. Individuals do not passively await situations and their outcomes but actively try to influence their environment to obtain or generate expectation-consistent outcomes. Both before and after an expectation violation, assimilative behavior contains the avoidance of situations that may provide expectation-violating information or the active search for expectation-consistent information. Before an exam, individuals can align their effort in learning with their expectations and invest a sufficient amount of time in preparation to fulfill their expectations. Also, after receiving a grade that is misaligned with their expectations, individuals can increase their effort to be more likely to fulfill their expectations next time.

Contrary, immunization and accommodation are considered coping responses to expectation violations (Panitz et al., 2021). Immunization refers to minimizing the impact of a situational outcome on the generalized expectation, which prevents expectation update and involves self-protective negotiation of potentially self-discrepant evidence (Brandtstädter & Greve, 1994). Data-oriented immunization consists of ignorance or denial of information, assigning low reliability/credibility to information sources, or subtyping such as perceiving an unexpected event as an exception from the rule (Pinquart, Rothers, et al., 2021). For example, individuals may consider a disconfirming exam grade as something that is not likely to happen again. Accommodation is the only mechanism leading to expectation updates in order to increase consistency with the experienced outcome. Expectations can be either changed or destabilized when new evidence is integrated into expectations (Panitz et al., 2021). For example, a disconfirming grade can lead to adjusted expectations for the next exam.

These coping strategies are not mutually exclusive, but may partly complement each other. It can be assumed that coping with expectation violations follows a sequential process, such as proposed in research on assimilation as primary coping and accommodation as secondary coping (e.g., Heckhausen & Schulz, 1995) and in research on developmental changes (Greve, 2000). Greve (2000) assumes that individuals first try to maintain their expectations and self-concept, which is why they initially react with immunization when faced with information that is inconsistent with their self-concept. With increasing discrepant experiences, however, immunization is no longer effective, so

subsequently individuals attempt to change their behavior through assimilation in such a way that future discrepancies become less likely. At some point, however, even the attempt at compensation fails, and individuals eventually adjust their expectations to reality through accommodation. Therefore, whereas discrepancies may be ignored in the case of a single violation of expectations, more frequent deviations from expectations require more elaborate coping through assimilation or accommodation (Greve, 2000). Accommodation and assimilation may also be shown simultaneously. After a failed exam, students reduced their achievement expectations and increased their effort and related performance in the next exam (Pinquart, Rothers, et al., 2021; Radhakrishnan et al., 1996).

Which strategy is the most adaptive one in a specific situation depends on situational characteristics. Expectation maintenance may be more adaptive to disregard noise (i.e., minor variations in outcomes; Hohwy, 2017), to avoid negative emotions after disappointments (Proulx et al., 2012), or to protect strong self-relevant expectations and the self-concept (Panitz et al., 2021; Pinquart & Block, 2020). Contrary, sometimes individuals invest resources into defending their expectations and belief system rather than updating it with negative consequences due to more frequent expectation violations and a less predictable environment (Panitz et al., 2021; Rief et al., 2015). On the other hand, lowering expectations after failures can also have long-term costs due to a less positive self-concept and less optimistic future beliefs (Pinquart & Block, 2020). Finally, expectation update vs. expectation maintenance depends on the costs and benefits of updating vs. maintaining expectations, which vary according to the situational characteristics of expectation violations. Psychological costs such as a more negative self-concept (Greve & Wentura, 2010) may outweigh the benefits of holding accurate expectations (Panitz et al., 2021).

2.3 Predictors

Therefore, the ViolEx model assumes that objectively comparable situations can lead to completely different responses to expectation violations between individuals based on differences in direct experiences, social influences, and individual differences (Panitz et al., 2021). Direct experiences consist of current situational expositions or prior experiences with a kind of situation, social influences include parents, peers, teachers, significant others, or any other social factor, and individual differences refer to genes or personality traits (Gollwitzer et al., 2018).

Furthermore, situational parameters such as controllability and valence are decisive for the (often unconscious) choice of coping processes (Brandtstädter & Renner, 1990). How individuals cope with expectation violations varies substantially across individuals and depends on *person x situation* interaction effects (García Alanis et al., 2023; Rief et al., 2015). Both characteristics of the situation and individual dispositions are important

predictors to evaluate conditions that promote vs. inhibit expectation update (Pinquart, Rothers, et al., 2021).

Extensive knowledge of predictors of coping with expectation violations is needed theoretically for the refinement and evaluation of the ViolEx model and practically to apply this knowledge for implications on the modification of dysfunctional expectations (Pinquart, Rothers, et al., 2021). Therefore, experimental expectation violation paradigms are required which include multiple situational and dispositional predictors and assess their interplay. The number of scientific publications related to expectation violations has increased exponentially in the past years, underlining the theoretical and practical need for extended knowledge (García Alanis et al., 2023).

Especially in the educational context, knowledge is needed on situations and dispositions that promote adaptive coping with violated expectations. After receiving an unexpected grade in an exam, individuals should differ in coping depending on predispositions such as the extent of biased educational expectations, prior grades, or an individual's preferred coping strategy, but also depending on how individuals generally expect to be in education according to their academic self-concept (Rodriguez, 2009; Skaalvik, 2018).

2.3.1 Personality Dispositions

2.3.1.1 Dispositional Coping Preferences

Although coping strongly depends on situational characteristics, individuals have a trait-like preference to report one coping response more than the other (Brandtstädter & Rothermund, 2002; Haratsis et al., 2015). These interindividual differences are dispositional preferences that can be modified in certain situations and can also be a combination of preferred coping strategies (Boerner, 2004). Dispositional preferences correspond to a person's relatively stable, cross-situational tendency to prefer certain information processing strategies relative to other strategies when coping with an expectation violation or processing the expectation-violating information (Eller, 2020). Therefore, individuals can be considered to be somehow biased towards a certain response after experiencing an expectation violation.

2.3.1.2 The Academic Self-Concept and Self-Enhancement

The academic self-concept (ASC) is defined as the mental representation of one's academic abilities in general and in different academic domains (Arens et al., 2021). ASC is considered a multidimensional and hierarchical construct (Arens et al., 2021) with four underlying motives: self-enhancement, self-verification, self-assessment, and self-improvement. Self-enhancement is inherent in healthy individuals (Hepper et al., 2010) and serves to augment the positivity of ASC and diminish negativity to achieve personal satisfaction and feelings of effectiveness (Hay et al., 1999). Self-enhancement is a cognitive

self-serving bias in dealing with feedback (Alicke & Sedikides, 2009) leading to overly positive evaluations of the self (Dufner et al., 2015) and therefore potentially contributing to overly optimistic educational expectations. Because individuals aim to maintain and secure a positive and stable self-concept (Hay et al., 1999; Hepper & Sedikides, 2012), positive feedback will be processed more extensively as it is low in threat potential, whereas negative feedback contradicts the positivity and stability of the ASC and is therefore high in threat potential (Green et al., 2005). In line with that, individuals show better memory for positive self-relevant information and tend to interpret ambiguous information in a self-serving manner (Hepper et al., 2010). This also affects coping with expectation violations, because people respond to self-relevant information in a way that enhances their self-concept (Alicke & Sedikides, 2011; Caprar et al., 2016).

The threat potential of discrepant negative information can be an important determinant of whether this information will be accepted (Caprar et al., 2016). The ASC can be central to a person's identity, resulting in high costs of accommodation after negative expectation violations (Brandtstädter & Rothermund, 2002). Therefore, stronger educational expectations and stronger confidence in expectations lead to a decreased likelihood of accommodation (Benrimoh et al., 2018; Paulus et al., 2019), because individuals are more likely to interpret new information in a favorable manner or downplay disconfirming information, especially when new evidence is negative, to maintain a positive ASC (Pinquart, Rothers, et al., 2021). But feedback in educational settings often serves to aid learning, which raises the question of whether self-enhancement interferes with the long-term usefulness of feedback (Hepper & Sedikides, 2012).

2.3.1.3 Need for Cognitive Closure

Individuals differ in their cognitive styles and preferences aimed to structure information about the environment into expectations and schemata as simplified models of reality. An individual's need for cognitive closure (NCC) is defined as the desire for clear and non-ambiguous answers (Kruglanski & Webster, 1996), the tendency to reduce discomfort in the face of cognitive uncertainty through rapid formulation and brief validation of hypotheses (Strojny et al., 2016). Therefore, individuals are biased toward any certain answer compared to confusion or ambiguity (Webster & Kruglanski, 1997). Individuals with higher NCC desire to attain closure quickly (urgency tendency) and also freeze upon prior knowledge and expectation (permanence tendency; Webster & Kruglanski, 1997). When individuals experience expectation violations, higher NCC should lead to stronger expectation persistence (Neuberg & Newsom, 1993) with stronger immunization (Dijksterhuis et al., 1996) and assimilation (active search for expectation confirmation; Kossowska et al., 2010). NCC is moderately to highly correlated with other cognitive styles such as need for structure or intolerance for ambiguity, but previous research in the context of expectation (violations)

focused more strongly on NCC with more evidence to rely on (e.g., Dijksterhuis et al., 1996; Kemmelmeier, 2015; Strojny et al., 2016).

For self-relevant information such as educational expectations, higher NCC should lead individuals with stable and positive self-schemata to filter and reinterpret information in an expectation-maintaining and self-enhancing manner to avoid both self-concept threat and ambiguity (freezing in prior self-beliefs and expectations; Taris, 2000). Individuals with higher NCC prefer expectation persistence because of their inherent reluctance to reconsider prior expectations, their stronger reliance on stereotypes (Dijksterhuis et al., 1996), and their preference for order and predictability (Kossowska et al., 2010). This leads to a post-decisional state when considering new evidence (Schrackmann & Oswald, 2014). Nevertheless, individuals with higher NCC are interested in holding accurate beliefs to avoid future expectation violations with the associated uncertainty.

Therefore, the question of how higher NCC affects coping with expectation violations cannot be answered conclusively but must be understood in a context-dependent manner (Kemmelmeier, 2015; Pinquart, Rothers, et al., 2021; Strojny et al., 2016). Despite the tendency to maintain prior expectations, higher NCC can also lead to a reduction of uncertainty when processing expectation-inconsistent information (Strojny et al., 2016). Individuals do not show biased processing toward expectation confirmation when it does not support the reduction of uncertainty or when inconsistent information is diagnostically more relevant (Schrackmann & Oswald, 2014; Strojny et al., 2016). This indicates that although NCC tends to be stable within individuals (Dijksterhuis et al., 1996), coping tendencies of individuals with higher NCC can vary across situations and are therefore highly dependent on the situational characteristics of expectation violations (Kossowska et al., 2010; Webster & Kruglanski, 1997).

2.3.2 Situational Characteristics

2.3.2.1 Valence of Disconfirming Information

Differences in coping are primarily rooted in the valence of the disconfirming event: whether discrepant information is better or worse than expected is considered the key determinant of responses toward expectation violations and the primary influence on coping (Afifi & Burgoon, 2000; Proulx et al., 2012). The so-called optimism bias refers to belief updating and coping with expectation violations that are optimistically biased in healthy individuals with stronger update/accommodation in response to good news/feedback and stronger persistence in response to bad news/feedback (Eil & Rao, 2011; Garrett & Sharot, 2017; Korn et al., 2014; Kube & Glombiewski, 2021; Lefebvre et al., 2017; Sharot, 2011). After receiving positive feedback or evidence, individuals tend to adjust their expectations (Kube & Glombiewski, 2021; Kube, Rief, et al., 2019), after receiving negative feedback, individuals tend to maintain their expectations (Kube, Kirchner, et al., 2019; Kuzmanovic &

Rigoux, 2017), comparable to formerly mentioned mechanisms of self-enhancement. Individuals show a tendency to interpret disconfirming or new evidence in a favorable and self-worth-stabilizing manner, depending on the emotional valence of disconfirming evidence to support desired self-relevant beliefs and expectations (Bromberg-Martin & Sharot, 2020; Korn et al., 2014). This biased processing of information supports unrealistic optimism and overly optimistic educational expectations (Garrett & Sharot, 2017; Sharot & Garrett, 2016) and underlines individuals' motivation to maintain a positive, but also accurate ASC.

Although there is plenty amount of research, both cognitive mechanisms driving the optimism bias and the adaptivity of holding optimistically biased expectations require further research. First, with regard to cognitive mechanisms, there is a lack of broader research in the educational context that includes cognitive styles such as NCC, and furthermore, the difficulty arises that the optimism bias is considered to be an automatic, unconscious process that individuals are not aware of (Kappes & Sharot, 2019; Kuzmanovic & Rigoux, 2017). As a result, it remains unknown how exactly the processing of positive vs. negative information leads to the optimism bias and the respective coping responses, as well as how other cognitive biases and styles such as NCC affect these mechanisms. Second, with regard to adaptivity, prior research questioned whether overly optimistic educational expectations reduce the level of uncertainty needed to motivate students to prepare for future academic challenges for avoiding failure (Ruthig et al., 2007), with potentially varying effects depending on individuals' NCC. Expectation persistence after worse-than-expected feedback can be suboptimal when leading to an underestimation of risk and reduced likelihood of precautionary action. But although optimism bias can have negative consequences, these are outweighed by adaptive consequences referring to longer life, better injury recovery, motivation for productivity and exploration, and a higher chance of innovation and success (Sharot & Garrett, 2016). The optimism bias refers to expectations regarding specific outcomes (Ruthig et al., 2007) and relies on both cognitive and affective components aimed at both reducing uncertainty, but also maintaining and enhancing the ASC.

2.3.2.2 Controllability of the Disconfirming Event

In the academic context, situational controllability is defined as the expectation about the extent to which one can influence successes and failures of situational academic outcomes (Respondek et al., 2017), including beliefs about one's abilities, efforts, and expectations about constraints and obstacles (Robinson & Lachman, 2017). Higher controllability in academics was associated with better achievement (Respondek et al., 2017; Ruthig et al., 2009), less depression (Ruthig et al., 2009), and lower drop-out intentions (Respondek et al., 2017). How individuals interact with their environment strongly depends on how much control they perceive over it (Heckhausen et al., 2010), but has to be

separated from the objective amount of situational control (e.g., Endler, Speer, et al., 2000). Higher controllability leads to stronger persistence and efforts to overcome obstacles (Brandtstädter & Rothermund, 2002), indicating stronger assimilation after expectation violations (see also Gesualdo & Pinquart, 2022). Nevertheless, individuals do not necessarily use stronger accommodation after uncontrollable expectations violations: accommodation is sometimes (Gesualdo & Pinquart, 2022), but not always predicted by low control (Brandtstädter, 1998; Skinner et al., 2003). Accommodation may be especially likely and adaptive after multiple expectation violations, indicating a stable and uncontrollable source of expectation violations (Pinquart, Rothers, et al., 2021).

Differences in assimilation and accommodation may rely on the effects of the optimism bias. An increase in optimism bias is related to biased perceptions of control (Helweg-Larsen & Shepperd, 2001): optimistic individuals have higher control perceptions (Ruthig et al., 2009) and tend to overestimate the amount of control they have over their environment (Endler, Speer, et al., 2000). Thus, overly optimistic expectations can be problematic if they are associated with uncontrollable attributions, but are less likely to result in disappointment or failure when they are associated with controllable attributions (Ruthig et al., 2004; Ruthig et al., 2007). Overly optimistic expectations and high controllability can also favor setting high expectations and taking personal responsibility to meet optimistic expectations (Ruthig et al., 2007).

Controllability over academic outcomes is widely accepted as a powerful buffer of stress (Endler, Speer, et al., 2000), one of the most meaningful personal resources in coping with obstacles or failures, and a fundamental psychological need to be effective in interactions with the environment (Skinner & Zimmer-Gembeck, 2010). With high controllability, even worse-than-expected outcomes are perceived rather as a challenge than as a threat (Skinner & Zimmer-Gembeck, 2010) and academic setbacks lead to persistence as long as they are perceived as controllable (Bhanji et al., 2016). But it can be considered as a developmental task to learn to distinguish between situations where persistence pays off (due to changeable circumstances) vs. situations where it does not (because the individual cannot change it; Compas et al., 1991). Therefore, how to adaptively cope with successes and failures in academics depends strongly on the amount of controllability and further characteristics of the situation (Endler, Speer, et al., 2000).

2.3.2.3 Degree of Expectation Violation

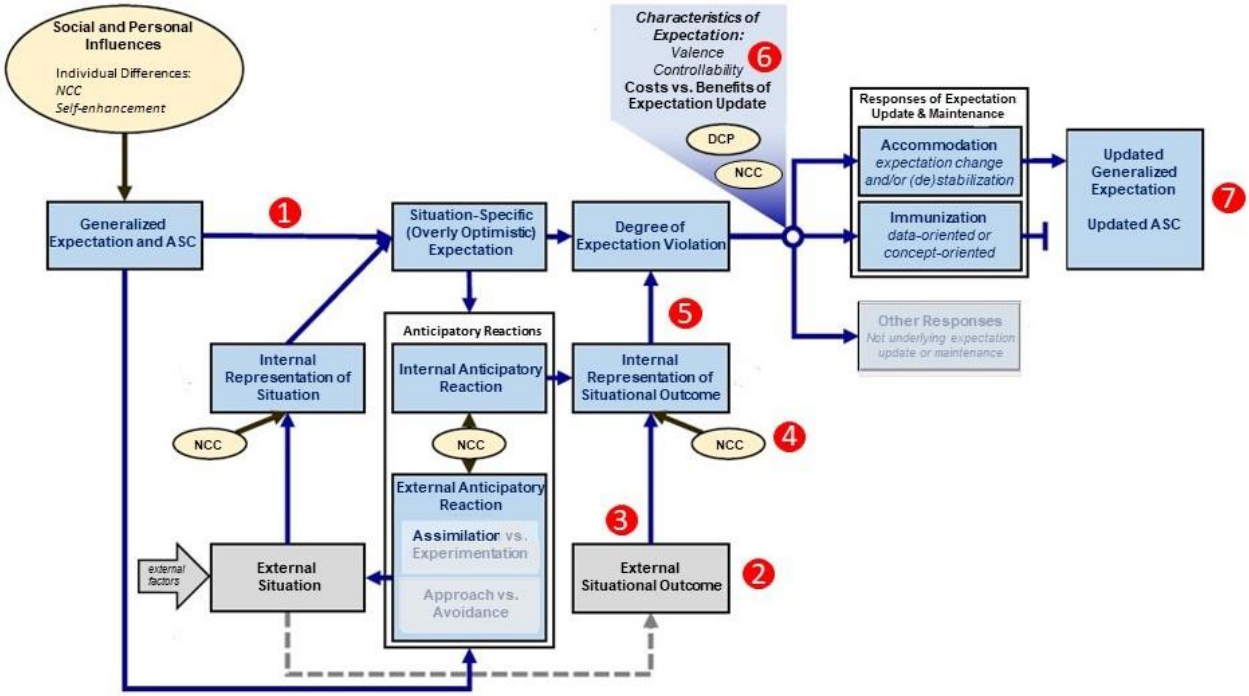
Grades can be better or worse than expected, successes and failures can be due to controllable or uncontrollable circumstances, but unexpected grades can also differ in the degree of expectation violation. The degree of expectation violations is considered a major predictor of coping with expectation violations (Afifi & Burgoon, 2000; Pinquart, Rothers, et al., 2021; Roese & Sherman, 2007). Small discrepancies tend to be neglected as noise and

are easy to ignore – intensive processing would be accompanied by high cognitive costs (Hohwy, 2017; Kruglanski et al., 2020; Panitz et al., 2021). Whereas all relevant theories and study results agree on that, it remains controversial whether large discrepancies are downplayed via subtyping as exceptions from the rule (Filipowicz et al., 2018; Pinquart, Rothers, et al., 2021; Roese & Sherman, 2007) or whether large discrepancies are necessary for learning according to the delta rule (Rescorla & Wagner, 1972). Some findings indicate an inverted U-shape for accommodation: small and large discrepancies from expectations lead to immunization, but moderate discrepancies lead to accommodation and the revision of expectations (Pinquart, Rothers, et al., 2021; Roese & Sherman, 2007). These findings are based on the assumption that moderate discrepancies are large enough to be recognized, but not too large to be questioned in credibility.

3. Research Objectives

Coping with expectation violations depends strongly on both situational characteristics and individual dispositions (Panitz et al., 2021; Pinquart, Rothers, et al., 2021). Figure 2 illustrates our integration of the predictors into the existing ViolEx model, the numbers in the text refer to the numbers in the figure. In the educational context, individuals strive for a positive and stable ASC. This often-biased positive belief about one's academic abilities can lead to biased over-optimistic educational expectations. In specific situations within this context, such as exams, individuals hold expectations towards their successes or failures within these exams, based on their general ASC (1). At some point during the educational process, expectations do not come true (2) and these expectation violations lead to arousal, which requires a coping response (3). Although all individuals with biased educational expectations are likely to experience an expectation violation once in a while, these disconfirming situations may be especially aversive for students with a higher NCC (4). Which coping response is likely to occur depends on how strongly the expectation was violated, considering that it might be regarded as noise (5). Additionally, due to the desire for a positive ASC, the valence of the expectation violation is a critical influence on coping. Positive vs. negative feedback is subject to a biased coping response (optimism bias) and a self-serving bias: positive feedback is used for self-enhancement and tends to lead to accommodation; negative feedback requires self-protection and tends to lead to expectation persistence. Whether these biases lead to adaptive coping depends strongly on how controllable the expectation-violating situation was (6) and interacts with personality dispositions such as NCC, dispositional coping preference, or self-enhancement. Thus, coping responses, especially in the case of negative valence, are in the area of tension between the costs and benefits of a revised ASC or more frequent expectation violations (7). Only with accommodation after disconfirming feedback/evidence, individuals update their generalized expectation and therefore, their ASC.

Figure 2. Own conceptualization of level 2 of the ViolEx model by Panitz et al. (2021, p. 10)



Knowledge is needed to theoretically evaluate the ViolEx model, but also to practically use this knowledge for implications on coping with expectation violations in the educational context. To predict coping responses, conditions that promote vs. inhibit the use of accommodation, assimilation, and immunization have to be identified. But until now, research is characterized by a lack of a) experimental studies, b) inclusion of personality dispositions, c) studies on predictors of assimilation, d) inclusion of a broad range of predictors, e) analysis of interactions between predictors, and f) inclusion of the educational and academic context. Furthermore, there are partly contrary theoretical assumptions and results about the effects of predictors, for example regarding the degree of expectation violation. Extensive knowledge is needed for both theoretical refinement and evaluation of ViolEx and practical change of dysfunctional expectations such as those contributing to academic failure.

Therefore, this thesis aims to experimentally test multiple situational and dispositional predictors in the academic context regarding their main effects and interaction effects on accommodation, assimilation, and immunization. The first study was the primer attempt to include multiple situational and dispositional predictors in an achievement task. The second study aimed to enhance understanding of the interaction of the situational predictor *valence of EV* and the personality disposition *NCC*. The third study then included *self-enhancement* and *controllability* to improve comprehension of the optimism bias. Table 1 summarizes an overview of the included predictors and the direction of our assumed main effects and impacts on coping with violated educational expectations.

Table 1. Assumed Main Effects of Included Predictors on Coping

PREDICTOR	ACCOMMODATION	ASSIMILATION	IMMUNIZATION
Disposition[1]	+	+	+
NCC		+	+
Self-enhancement	+		-
Valence			
Positive	+		
Negative		+	+
Controllability			
High		+	
Low			+
Degree			
Small			+
High	+		

Note. [1] Disposition refers to dispositional coping preferences for accommodation, assimilation, and immunization, and we assumed that the respective coping preference positively predicts the situational coping response

4. Empirical Studies

4.1 Study 1: Dispositional and situational predictors of coping with violated achievement expectations

Reference: 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

Theory: According to the ViolEx model (Gollwitzer et al., 2018; Rief et al., 2015), coping differs depending on situational and dispositional predictors. Individuals are likely prone to an optimism bias, indicating stronger accommodation after better-than-expected feedback and stronger immunization after worse-than-expected feedback (Chowdhury et al., 2014; Garrett & Sharot, 2017; Kube, Kirchner, et al., 2019; Kube, Rief, et al., 2019; Lefebvre et al., 2017; Sharot et al., 2011). In addition, the delta rule, which is one of the most common learning rules, assumes that a large degree of expectation violation results in stronger accommodation (Rescorla & Wagner, 1972). Contrary, we assumed that a small degree of expectation violation is more likely to be regarded as noise and results in stronger immunization. Furthermore, individuals are reluctant to change expectations that are closely tied to their self-concept: a higher relevance of the expectation should lead to stronger immunization after discrepant negative feedback (Greve & Wentura, 2003; Stussi et al., 2018).

Dispositional preferences increase the likelihood of dealing with a stressor in a certain way (Connor-Smith & Flachsbart, 2007; Lazarus & Folkman, 1984). Regarding cognitive strategies, NCC is aimed to simplify a complicated world, and individuals with higher NCC should be more likely to ignore and resist discrepant feedback with higher assimilation or immunization (Neuberg & Newsom, 1993). Additional to the situational influence of the optimism bias, dispositional optimism might explain asymmetric coping with expectation violations: higher optimism should lead to stronger immunization after discrepant negative feedback.

Methods: We first captured personality dispositions with NCC, dispositional coping preference, and dispositional optimism and then manipulated three situational characteristics of the expectation violation. We conducted a 45min online study with a 2 (positive vs. negative valence) x 2 (high vs. low degree) x 2 (high vs. low relevance) experimental design with computer-based random assignment to the eight experimental groups. Participants' task was to solve analogies as an alleged investigation for the correlation between analogy solving and academic performance. Relevance was manipulated with the instruction that analogy tests predicted academic success in prior studies in all study fields vs. only for informational scientists (who were excluded from the study if they participated). Valence was manipulated after building up positive vs. negative expectations with better-than-expected or

worse-than-expected feedback on their test performance. In the second test block, we changed the task difficulty between the groups and participants received standardized feedback that they performed slightly or strongly (manipulation of degree) above or below their expectations (valence manipulation). Afterward, participants were asked how they cope with the disconfirming feedback.

Results: Our final sample consisted of $N = 439$ participants and we conducted a MANCOVA to investigate the statistical effects of both situational characteristics and personality dispositions on three coping strategies. Valence of expectation violation did not predict accommodation or immunization according to optimism bias, but negative valence of expectation violation led to significantly stronger assimilation. Contrary to the delta rule, a high degree of expectation violation did not lead to stronger accommodation but instead predicted stronger immunization. Relevance was not a significant predictor of coping. Furthermore, we found an interaction effect between valence and degree: a large degree of expectation violation together with negative valence of feedback (“you performed strongly below your expectations”) led to stronger immunization.

Regarding individual dispositions, optimism was not a significant predictor of coping. Contrary to our assumption, NCC significantly predicted stronger accommodation and was almost a significant predictor of stronger assimilation. Finally, coping indeed seemed to depend on dispositional preferences for coping, as both accommodation and assimilation were significantly predicted by their dispositional tendency, and immunization only slightly failed significance.

Discussion: Supporting theoretical assumptions of the ViolEx model, we confirmed that coping with expectation violations in an educational context is predicted by both situational and dispositional characteristics. We found that a trait-like dispositional preference for coping strategies resulted in significant individual differences in coping, nevertheless coping also varied by situational characteristics. Our study results indicate that individuals aim to protect and maintain their ASC, with stronger assimilation after negative valence of expectation violation, stronger immunization (subtyping) after a large degree of expectation violation, and stronger immunization after experiencing a large negative expectation violation. All of these strategies serve to maintain positivity and are adaptive for coping with a single expectation violation. Furthermore, NCC is related to both accommodation and assimilation, appearing to be a flexible and context-dependent construct requiring further research. But contrary to numerous other studies, we were unable to find the assumed optimism bias, which is why we consider a need for further research on the valence of expectation violation.

4.2 Study 2: Expectations do not need to be accurate to be maintained

Reference: 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

Theory: Coping with violated educational expectations likely differs between better-than-expected and worse-than-expected outcomes, but nevertheless also depends on personality dispositions (Panitz et al., 2021). Overly optimistic educational expectations operate in the controversy between adaptive advantages such as a more positive ASC, and a higher frequency of expectation violations with the inherent uncertainty that is especially aversive for individuals with high NCC. Higher NCC may be associated with both stronger assimilation and stronger accommodation, which contributes to individuals' motivation to maintain a positive and stable ASC, but nevertheless, adapt to changing circumstances to reduce aversive arousal. The likelihood of each coping response is determined by a trade-off between costs and benefits (Panitz et al., 2021). We aimed to explore optimistically biased coping, context-dependent effects of higher NCC on both accommodation and assimilation, and interactions of NCC and valence of expectation violation on coping responses.

Methods: We conducted a 45min online experiment with computer-based randomization and a one-factor between-subject design to manipulate the valence of expectation violation. We first captured individuals' NCC. Then, we used anagrams as word riddles in which randomly arranged letters must be rearranged to form a word. The experimental groups varied in test information, anagram difficulty, and standardized performance feedback to generate negative expectations (followed by positive expectation violation) or positive expectations (followed by negative expectation violation) for two runs with 11 anagrams each. In the third run, we changed the anagram difficulty and standardized performance feedback between the groups, and participants experienced an expectation violation. Afterwards, they were asked how they coped with the discrepant feedback.

Results: Our final sample consisted of $N = 268$ participants. We conducted a MANCOVA to evaluate the assumed effects. Both valence and NCC were found to be predictors of coping responses: both revealed a significant statistical effect on accommodation and assimilation, but not on immunization. Contrary to the optimism bias, positive valence was not associated with higher accommodation, whereas negative valence was associated with higher assimilation. For NCC, we found the assumed effect that higher NCC predicted both stronger accommodation and assimilation. Furthermore, the interaction of both variables was a significant predictor of accommodation and assimilation. Higher NCC was associated with higher accommodation and assimilation only after worse-than-expected feedback.

Discussion: Supporting theoretical assumptions of the ViolEx model and results of our former study, we identified both valence and NCC as significant predictors of accommodation and assimilation. Again, we confirmed the optimism bias only for worse-than-expected feedback: whereas negative valence led to stronger assimilation, positive valence led to less accommodation. Individuals with higher NCC reported both stronger accommodation and assimilation, indicating that the combination of both strategies may be adaptive to fulfill both needs of maintaining a positive and stable ASC, but also avoiding frequent expectation violations in the future. This assumption is supported by the found interaction effect between negative valence and higher NCC on stronger accommodation and assimilation. Further research should consider both NCC and valence in the context of generalized expectations and include additional predictors to explore mechanisms behind the found effects.

4.3 Study 3: The role of optimism bias and NCC in coping with violated educational expectations

Reference: Henss, L. & Pinquart, M. (under review). Coping with expectation violations in education: The role of optimism bias and need for cognitive closure

Theory: To better understand mechanisms behind the optimism bias (and the lack of effect of positive valence of expectation violation) and context-dependent effects of NCC, we included controllability and self-enhancement as predictors. Uncontrollable expectation violations are likely to increase individuals' aversive arousal and, similar to negative feedback and especially in interaction with negative valence, pose a threat to the ASC. Uncontrollability requires adaptive coping responses, especially in individuals with higher NCC who perceive expectation violations as particularly aversive. Contrary, to accommodate after receiving positive feedback, individuals need to integrate better-than-expected outcomes into their ASC and process positive feedback extensively. Under these circumstances, self-enhancement is assumed to promote accommodation.

Methods: We conducted a 20min online experiment as a 2x2 between-subjects design and manipulated valence and controllability of the expectation violation. We first captured participants' NCC and then used four different achievement contexts in university (exam grade, job interview, lecture, written assignment) and described expectation-violating situations in four case vignettes. Case vignettes differed between the groups only in controllability and valence. After each case vignette, participants were asked how they would cope with the described situation. Self-enhancement was assessed after reading all four case vignettes with reference to them.

Results: Our final sample consisted of $N = 249$ university students. We conducted a MANCOVA with valence of expectation violation and controllability as predictors and NCC and self-enhancement as covariates. We found that for negative valence, participants reported higher levels of all three coping responses. Higher controllability predicted stronger accommodation and assimilation, but less immunization. Higher NCC significantly predicted stronger expectation maintenance (significant statistical effect on assimilation and immunization). We found that participants reported stronger assimilation after perceiving a negative and controllable expectation violation. Higher self-enhancement predicted stronger accommodation after better-than-expected events and stronger immunization after worse-than-expected events. NCC significantly interacted with controllability: individuals with lower NCC reported more accommodation in a controllable situation, and individuals with higher NCC reported more accommodation in an uncontrollable situation.

Discussion: Supporting theoretical assumptions, we found that there is an optimism bias in coping with violated educational expectations, but the effect depends on the inclusion of further predictors. To accommodate rather than immunize after an unexpected positive

outcome, a promoting condition is higher self-enhancement. To maintain expectations despite negative outcomes, a promoting condition is higher controllability. The coping pattern of both higher assimilation and accommodation previously reported by individuals with higher NCC was now evident for participants who experienced higher controllability. We concluded that the optimism bias can be considered adaptive if the coping responses are related to controllable characteristics. In an uncontrollable situation, it is decisive to consider how likely expectation violations will be in the future. Practically, for all individuals but especially those with higher NCC, care should be taken in the educational context to ensure that performance feedback and implications are related to controllable aspects.

5. Discussion

Educational expectations are crucial cognitions as they influence and affect present behavior, future outcomes, well-being, and academic achievement (Carolan, 2017; Rief & Glombiewski, 2017). Educational expectations tend to be overly optimistic, but have little downsides and even resulted in positive outcomes in previous studies (Carolan, 2017; Domina et al., 2011). Nevertheless, inaccurate expectations lead to more frequent expectation violations. Whether individuals change or maintain educational expectations after receiving disconfirming information is considered a value-based decision (Bromberg-Martin & Sharot, 2020) between the accuracy of expectations (accommodation for expectation change) and the stability of expectations and the ASC (assimilation and immunization for expectation maintenance). Individuals may compare the value of expectation change with the value of maintaining prior expectations and the coping response depends on the perceived higher utility (Sharot et al., 2023). Our studies showed that whether educational expectations are changed or maintained after an expectation violation depends on situational characteristics and personality dispositions.

5.1.1 Situational Characteristics

5.1.1.1 Valence

Expectation change is more likely when the expected utility of adjusting the expectation outweighs the value of maintaining the expectation (Sharot & Sunstein, 2020). When expectation change threatens the positivity of the ASC, individuals are more likely to experience aversive arousal and should prefer maintaining expectations (Pinquart, Endres, et al., 2021; Proulx et al., 2012), whereas they should be more likely to change expectations when expectation change enhances the ASC. This optimistically biased coping results in stronger expectation update (accommodation) in response to better-than-expected information and stronger expectation persistence (assimilation/immunization) in response to worse-than-expected information (Eil & Rao, 2011; Garrett & Sharot, 2017; Korn et al., 2014; Kube & Glombiewski, 2021; Lefebvre et al., 2017; Sharot, 2011). But in our first two studies, the optimism bias was only partly confirmed: we found stronger assimilation after negative feedback in both studies, indicating a corrective focus of self-improvement to fulfill one's own educational expectations (Brandtstädter & Rothermund, 2002) and the willingness to maintain a stable and positive ASC (Caprar et al., 2016). The third study extended our results and showed that higher controllability interacts with negative valence and supports stronger assimilation. Stronger assimilation after receiving negative feedback indicates high adaptivity because it implies that in the case of worse-than-expected performance, especially due to self-inflicted controllable circumstances (e.g., too little learning effort, inadequate preparation), behavior is improved and the likelihood of future negative expectation violations is reduced. Coping with negative valence of expectation violations can

be understood as a cost-benefit trade-off of accurate vs. positive expectations, with our results indicating a stronger tendency to remain a positive ASC rather than holding accurate educational expectations.

Contrary, in the first two studies we did not find stronger accommodation after positive valence, in the second study students reported even less accommodation after better-than-expected feedback. With the third study, we revealed that students need to process better-than-expected feedback in a self-enhancing manner to support stronger accommodation. Thus, in the context of educational expectations, accommodation to better-than-expected feedback seems to be less pronounced than, for example, in the clinical context with healthy participants (Kube & Glombiewski, 2021; Kube, Rief, et al., 2019) or learning psychology (Kuzmanovic & Rigoux, 2017; Lefebvre et al., 2017). The lack of expectation adjustment might depend on two factors: on the one hand, deep processing and integration of feedback into the ASC through self-enhancement may be needed to promote accommodation, and on the other hand, the tendency for over-optimistic educational expectations might leave less scope for upward adjustments. Positive expectations can promote positive achievement outcomes by increasing motivation and self-efficacy (Bromberg-Martin & Sharot, 2020), which is why mechanisms for positive expectation change are important to capture.

5.1.1.2 Degree of Expectation Violation

Supporting our results on stronger expectation maintenance after negative valence, we found that a large degree of expectation violation also led to stronger expectation maintenance. Strongly negative feedback led to stronger immunization and ASC protection against threatening information through self-protective denial (Brandtstädter & Greve, 1994). The results of our first study contribute to the ongoing controversy about coping with large expectation violations. Although we suspected a large degree to result in accommodation in accordance with the delta rule in learning psychology, our finding was in line with other theories (Roese & Sherman, 2007) and results from the clinical context (Hird et al., 2019; Kube et al., 2022). We found that the larger the expectation violation, the stronger individuals reported immunization as a coping response. Students probably used subtyping to maintain a positive ASC (Olson & Fazio, 2004) and interpreted the expectation violations rather as an exception from the rule. Subtyping is especially likely when situational circumstances and additional clue stimuli enhance the differentiation of the expectation violation from other feedback (Pinquart, Rothers, et al., 2021). In our study, participants received feedback on a task they have probably never done before, which facilitates subtyping the negative feedback as an exception. Whereas in practice this may be considered adaptive for single large negative expectation violations, in the case of persistent expectation violations, the cause of the large deviations in grades or feedback should be urgently evaluated.

5.1.1.3 Controllability

Also supporting our findings on stronger expectation maintenance after negative valence, negative feedback in controllable situations led to stronger assimilation. Higher controllability indicates adaptivity and should therefore be encouraged among students, as it was associated with better achievement (Respondek et al., 2017; Ruthig et al., 2009), less distress (Endler, Macrodimitris, et al., 2000), less depression (Ruthig et al., 2009), and lower drop-out intentions (Respondek et al., 2017) in former studies. In our study, we found that higher controllability led to stronger assimilation and accommodation (a coping pattern similar to higher NCC) and less immunization, supporting our assumption that both accommodation and assimilation might be an adaptive coping pattern after experiencing an expectation violation.

5.1.2 Personality Dispositions

5.1.2.1 Dispositional Coping Preference

Although our results revealed that situational characteristics strongly influence how individuals cope with expectation violations, our results also indicate that a cross-situational, dispositional coping preference exists. Individuals are thus biased to some extent in their coping response—both towards maintaining a positive self-concept and their preferred strategy for doing so.

5.1.2.2 The Academic Self-Concept and Self-Enhancement

The inherent self-enhancing tendency in healthy individuals to augment the positivity of the ASC was also evident in our present studies. In all three studies, individuals' coping responses were strongly oriented toward protecting the ASC from negativity, and furthermore, individuals with stronger self-enhancement reported more immunization after experiencing a negative expectation violation. In addition, after experiencing a positive expectation violation, only individuals with stronger self-enhancement reported stronger accommodation. Thus, our results indicate that self-enhancement is a cognitive bias that can strengthen overly positive educational expectations (Dufner et al., 2015) and that positive feedback is more strongly integrated into the ASC than negative feedback (Caprar et al., 2016; Green et al., 2005). Moreover, self-enhancement was identified as a cognitive mechanism that could be one of the factors driving the optimism bias.

5.1.2.3 Need for Cognitive Closure

Individuals with higher NCC should be especially motivated to secure and maintain their ASC because of their strong avoidance of ambiguity (Webster & Kruglanski, 1997). We hypothesized that higher NCC would lead to stronger expectation persistence to avoid ambiguity and maintain a stable ASC. But higher NCC led to both more expectation-maintaining strategies (assimilation in all studies, immunization in study 3) and more expectation change (accommodation in studies 1 and 2). In study 2, the effect of higher NCC

on stronger accommodation and assimilation interacted with valence of expectation violation. Students reported the respective coping pattern only after worse-than-expected feedback. Although this coping pattern seems to be contradictory, it can be explained by two assumptions.

First, NCC involves two components, namely urgency and permanence tendency (Webster & Kruglanski, 1997). In the first two studies, participants received direct feedback in a word riddle task, which is an achievement test that students are not normally confronted with in their studies. Thus, there might be less of a permanence tendency because the task-related expectations were not elaborated for the task at hand. Thus, there might be more of an urgency tendency, leading students with higher NCC to quickly resolve uncertainty – either in the direction of the existing expectation or in the direction of the discrepant, new feedback. Disconfirming evidence can both enhance or reduce an individual's view to comprehend themselves and their environment (Sharot & Sunstein, 2020), which can either motivate assimilation or accommodation. This assumption is supported by the results of the third study. Although the case vignettes were fictitious situations, they were closely related to students' actual academic context. Here, students with higher NCC reported stronger expectation persistence and, for the first time in our studies, stronger immunization presumably due to a stronger elaboration of existing expectations and therefore a stronger permanence tendency to maintain these elaborated educational expectations.

Second, we have to consider that we found a medium-to-high correlation between accommodation and assimilation in all three studies. This finding indicates that individuals with higher NCC do not necessarily assimilate OR accommodate, but also combine both strategies. After disconfirming evidence, individuals can change their expectations according to the feedback, but nevertheless also change their behavior to fulfill their educational expectations. The coping pattern of both high assimilation and accommodation can promote the avoidance of future uncertainty-inducing expectation violations through accommodation and at the same time promote stability and positivity of the ASC through assimilation. In previous studies, individuals with both high primary and secondary control were considered to be able to protect themselves better against stress (Hall et al., 2006), underlining the potential adaptivity of this coping pattern. Nevertheless, the increased adaptivity of both coping strategies can only be assumed as long as they are not mutually exclusive (see Bak, 2019; Bak & Brandtstädter, 1998).

But higher NCC is not always related to adaptive coping responses. Students with higher NCC reported higher expression in all three coping strategies, indicating a higher need to respond to expectation violations and higher experienced aversiveness of expectation violations compared with students with lower NCC. Also, higher NCC was negatively related to the ASC, indicating that higher-NCC students' ASC is generally less

positive compared with individuals with lower NCC. In the third study, higher NCC led to stronger expectation persistence, but in combination with uncontrollability, higher NCC resulted in stronger accommodation. Contrary, lower NCC in combination with uncontrollability led to less accommodation. The adaptivity of expectation change in response to uncontrollable circumstances is questionable and strongly dependent on whether accommodation will make future expectation violations less likely.

Our results highlight the context-dependent effects of NCC (Kemmelmeier, 2015; Strojny et al., 2016) and indicate that although NCC is a stable personality trait, situational characteristics are crucial for the coping response and the adaptivity of coping in individuals with higher NCC (Kossowska et al., 2010; Webster & Kruglanski, 1997). All actual main effects of the included predictors are summarized in Table 2.

Table 2. Actual Main Effects of Predictors on Coping Responses

PREDICTOR	ACCOMMODATION	ASSIMILATION	IMMUNIZATION
Disposition	**+**	**+**	n.s.
NCC	+	**+**	**+**
Self-enhancement	**+**		**-**
Valence			
Positive	n.s.		
Negative		**+**	**+**
Controllability			
High	+	**+**	
Low			**+**
Degree			
Small			n.s.
High	n.s.		**+**

Note. Bold = effects as hypothesized, not bold = significant effects that were not hypothesized, n.s. = non-significant effects contrary to hypotheses

5.2 Contribution of this Thesis

Our studies support the assumption that expectation change vs. expectation maintenance is a value-based decision and coping responses depend on the trade-off of costs and benefits (Panitz et al., 2021). Overall, we supported that educational expectations tend to be stable and students aim to protect their ASC against negative feedback: we found stronger immunization after strongly negative performance feedback and after uncontrollable expectation violations, stronger assimilation after negative expectation violations, and

stronger assimilation after controllable and negative expectation violations. But stronger expectation maintenance also implies that educational expectations are not easily adjusted in a positive direction, we found significant statistical effects only in interaction with stronger self-enhancement.

We also indicated that the adaptiveness of expectation change vs. maintenance depends on situational characteristics and personality traits. Previous studies found that with higher controllability, individuals experience less stress, depression, and drop-out intention (Respondek et al., 2017; Ruthig et al., 2007) and with higher self-enhancement, individuals report higher well-being (Dufner et al., 2015) and strive for higher achievement goals (Ruthig et al., 2007). Therefore, adaptive coping with violated educational expectations can be promoted by supporting the controllability of the disconfirming information: in practice, feedback should address controllable aspects of achievement and ensure predictability and control through transparency and unambiguous tasks, criteria, and evaluation (Respondek et al., 2017). These practical implications should be adaptive for all students, but especially those with higher NCC and those experiencing worse-than-expected feedback, as they reported stronger overall coping responses to reduce stress, aversiveness, and the occurrence of future expectation violations. To avoid dysfunctional coping with violated educational expectations, conscious consideration should be given to when persistence and effort are likely to pay off to meet expectations: on the one hand, students should not resign after a one-time setback in order to maintain the adaptive effects of a positive ASC and optimistic educational expectations, but on the other hand, they need to adjust expectations at some point to avoid frequent disappointments, which also negatively affect the ASC in the long term. This process can be supported by involved persons (lecturers, teachers, parents, friends, partners) in addition to self-reflection.

Additional to practical implications, our results also shed light on the open question of co-occurrence vs. inhibition of coping responses (Pinquart, Endres, et al., 2021) and enhanced the understanding of ViolEx-related coping responses. Although accommodation and assimilation seem partly contradictory and might interfere in some situations (see regulatory dilemma; Bak, 2019; Bak & Brandtstädter, 1998), they were likely to co-occur and supplement each other in the educational context to a potentially adaptive coping pattern, indicating a different meaning of this coping pattern in educational research compared to developmental research. The combination of expectation adjustment and efforts to fulfill expectations can be adaptive to minimize the likelihood and magnitude of future expectation violations. The pattern of both high accommodation and assimilation was found in earlier studies (Eller, 2020; Siltanen et al., 2019), but our results and interpretations contribute to the theoretical assumptions of the interrelation of coping responses among the ViolEx model.

Our studies reduced the lack of experimental research on the relatively new ViolEx model by successfully establishing study designs in the context of educational and achievement-related expectations. We included previously neglected personality dispositions such as dispositional coping preferences, self-enhancement, and mostly NCC, and also focused strongly on how situational predictors and personality dispositions interact with each other. Indeed, we found that the included predictors partly depended on each other as some effects were only found in combination with other variables, especially those referring to the optimism bias. Our results on both personality dispositions and situational characteristics as well as their interactions promote the assumption that individuals tend to protect their ASC from discrepancies, and situational and dispositional predictors should be considered in interaction to increase the practical significance of results. Although all three studies focused on valence and NCC, we included a broad range of predictors and were able to contribute implications to partly conflicting theories and results about the effects of predictors (e.g., optimism bias, delta rule vs. subtyping theories). Our findings imply that the results from other subdisciplines cannot fully be transferred to the educational context, indicating the need to research within this highly important context for individuals' self. Finally, the inclusion of assimilation in all three studies strongly broadened our understanding of predictors of assimilation (NCC, valence, controllability, assimilative dispositional coping preference) and of the assimilative-accommodative coping pattern, supporting that the motivation to hold positive beliefs also refers to internal states such as assimilation (Bromberg-Martin & Sharot, 2020).

In conclusion, our findings underline that individuals are motivated to hold both positive and accurate beliefs, but nevertheless seemed to prioritize maintaining positivity of the ASC. This can be considered as adaptive as long as expectation maintenance does not lead to future disappointments which can induce aversive emotions and threats to the ASC (García Alanis et al., 2023).

5.3 Limitations and Future Research

Our studies contributed to a better understanding of situational characteristics and personality dispositions that affect coping with violated educational expectations, but nevertheless, there are also limitations and remaining open questions. Although we included a broad range of predictors, there are many more that have still been neglected and might be of importance for coping with violated educational expectations (e.g., credibility, elaborateness of expectation). Nevertheless, it will not be feasible to provide a full range of predictors in individual studies, but this requires research across many studies.

Because our experiments were among the first in the educational and academic context referring to the ViolEx model, we also had to generate new manipulations and measurements. In our studies, we found difficulties with manipulating the relevance of

expectations (study 1) and measuring coping strategies with good internal consistency (immunization subscale in studies 1 and 2, assimilation subscale in studies 1 and 2). Although we made progress in developing the experiments and measurements, there is still potential to enhance their quality.

In our studies, we focused strongly on how certain predictors affect coping responses, but we also included practical implications referring to the adaptivity of coping responses. Nevertheless, we had to rely on other studies to evaluate the adaptiveness of coping, because we did not capture adaptivity in our studies. Future research should develop a ViolEx-oriented measurement to directly evaluate the adaptivity of coping responses and therefore provide more practical assumptions on how to promote adaptive coping with violated educational expectations.

When considering our finding of the assimilation-accommodation coping pattern, the concept of tagging also seems to be of interest. Tagging refers to a delayed influence of expectation violations on expectation update, where disconfirming evidence does not directly lead to expectation change, but is tagged onto the expectation and may lead to accommodation later on, for example after multiple expectation violations and the failure of assimilation to fulfill prior expectations (Panitz et al., 2021; Roese & Sherman, 2007). Tagging could be especially of interest in the educational context because educational expectations are strongly elaborated and as our studies revealed, not easily changed. Therefore, multiple expectation violations or longer processing of expectation violations might have different implications on coping.

With our case vignettes, we examined scenarios closely related to academic reality, but nevertheless, these are still fictitious situations. To expand knowledge on coping with educational expectations, field studies would be interesting to conduct. The inclusion of field studies would also contribute to the actual significance of predictors. In reality, expectation violations have much more impact and therefore might point to an underestimation of the impact of predictors such as valence in our laboratory studies (Eil & Rao, 2011), but also relate to much more elaborated expectations. Therefore, the effects of predictors in reality could differ from our results in laboratory studies.

5.4 Conclusion

This thesis supports previous research on the persistence of educational expectations. We demonstrated that students prefer protecting the positivity of the ASC over the accuracy of expectations when experiencing expectation violations. Our research provides the first experimental results on the influence of situational characteristics, personal dispositions, and their interaction on coping with expectation violations in the educational context. Whereas negative valence of expectation violation, strongly negative expectation violation, and uncontrollable expectation violation contribute to expectation persistence,

positive valence of expectation violation interacting with higher self-enhancement and controllable expectation violations lead to more expectation change. Although these situational characteristics strongly influence coping behavior, dispositional differences also emerge: Individuals have cross-situational preferences for coping strategies and coping patterns, and higher NCC leads to a coping pattern of stronger assimilation and stronger accommodation. Ultimately, our results show that coping with expectation violations is subject to biases that do not always lead to accurate expectations and thus may also contribute to overly optimistic educational expectations. For weighing the costs and benefits of a coping response, individuals prefer the response that ensures a positive and stable ASC, possibly at the risk of experiencing more frequent expectation violations in the future.

6. References

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7. Appendix

Study 1: 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

Study 2: 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

Study 3: Henss, L. & Pinquart, M. (under review). Coping with expectation violations in education: The role of optimism bias and need for cognitive closure

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Dispositional and situational predictors of coping with violated achievement expectations

Larissa Henss and Martin Pinquart

Abstract

Most students experience expectation violations during their academic career, such as unexpected failed tests. However, contradictory evidence does not always result in expectation change (accommodation). Expectations often persist through stronger efforts to fulfil the expectation (assimilation) or ignoring the discrepancy (immunisation). Our study addresses possible situational and dispositional predictors that may be decisive influences on the use of the three coping strategies. We conducted an experimental study with $n = 439$ students who experienced an expectation violation in an achievement test. Dispositional coping tendencies, valence of expectation violation, and the interaction of valence and degree of expectation violation were found to predict situational coping. Furthermore, higher need for cognitive closure predicted stronger accommodation, and a large degree of expectation violation predicted stronger immunisation. Thus, our study provides initial evidence on which situational and dispositional factors predict coping with expectation violations in an educational context. Expectation violation in a performance context mainly resulted in stronger efforts to protect positive achievement expectations.

Keywords

Expectation violation; coping; ViolEx model; self-concept; education; academic

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During adolescence and emerging adulthood, young people become more interested in their future education and career (Eccles et al., 2004). Their educational expectations refer to what they realistically anticipate to achieve in school, university, or workplace. Educational expectations are widely accepted as decisive correlates and predictors of actual academic achievement and long-term educational attainment (Carolan, 2017; Domina et al., 2011a, 2011b; Morgan, 2004; Pinquart & Ebeling, 2020). In general, expectations consist of subjective assessments of the likelihood of future events, ranging from possible to certain (Roese & Sherman, 2007). The future orientation of expectations makes them particularly important cognitions because they can positively or negatively affect current and future well-being (Rief & Glombiewski, 2017).

Expectations can be inaccurate and disconfirmed by future events (i.e., expectation violation; Roese & Sherman, 2007). Educational expectations are closely tied to the academic self-concept (Skaalvik & Skaalvik, 2004; Suárez-Álvarez et al., 2014). Thus, a worse-than-expected achievement potentially threatens the academic self-concept. Because self-concept discrepancies are unpleasant (Festinger, 1957), individuals search for ways to cope with these discrepancies. The ViolEx (Violated Expectation) Model specifies three possible ways of coping with expectation violation: assimilation, accommodation, and immunisation (Gollwitzer et al., 2018). First, assimilation refers to proactive behaviour which increases the probability of future expectation-confirming events (Gollwitzer et al., 2018). A former successful student who failed an exam for the first time may work harder next time to fulfil the expectation of receiving excellent grades. Second, accommodation refers to the adjustment of expectations in direction of the expectation violation (Gollwitzer et al., 2018). After receiving a better or worse than expected grade, students could increase or decrease their future achievement expectation according to the feedback. And third, immunisation

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means that individuals devalue discrepant information (Gollwitzer et al., 2018). Students with positive expectations about their academic future might react defensively towards a negative test result with downplaying the validity of the disconfirming information. In summary, accommodation refers to the change of expectations while both immunisation and assimilation refer to the persistence of expectations. Our study focused on short-term coping strategies after a single expectation violation. After a single expectation violation, individuals are likely to respond immediately with immunisation and protection of their academic self-concept, because other coping processes may take longer or require multiple expectation violations.

Influences on coping

The ViolEx Model states that direct experiences, social and cultural influences, and individual differences predict which coping strategy individuals use (Gollwitzer et al., 2018). Although coping strategies have been considered trait-like in the past, their use often varies depending on situational demands and constraints (Haratsis et al., 2015). Previous studies provided only fragmentary knowledge on predictors of coping after expectation violation. Recent research broadened the understanding of possible influences, but mostly included only one predictor variable, often used non-experimental designs, or neglected dispositional influences (see Pinquart, Panitz, et al., 2021). Our study is the first attempt to capture coping strategies after the violation of educational expectations experimentally and with several situational and dispositional predictors. Pinquart, Panitz, et al. (2021) recently provided an extensive review on possible predictors of coping with expectation violation. We aim to expand knowledge on predictors of coping with expectation violation in an educational context by including situational (valence, degree, relevance) and dispositional (coping preference, need for cognitive closure, optimism) predictors.

Situational characteristics

First of all, whether expectations change or persist may be linked to characteristics of the expectation violation. An expectation violation can occur in two directions—either by a better- or a worse-than-expected outcome (Lebois et al., 2016). Previous studies indicate that individuals are likely prone to an optimism bias: When reality turns out to be better than expected, individuals tend to respond with a change of their expectations (Chowdhury et al., 2014; Garrett & Sharot, 2017; Sharot et al., 2011). Accordingly, individuals accommodated more strongly in previous studies after experiencing a positive expectation violation (Kube & Glombiewski, 2021). Contrary, when reality turns out to be worse than expected, individuals tend to disregard the discrepant information (Lefebvre et al., 2017) and thus immunise more strongly (Kube et al., 2019). In terms of educational expectations, this implies that students tend to increase their performance expectations for the next test after a better-than-expected test score and students tend to maintain their performance expectations after a worse-than-expected test score. Accordingly, we assumed that individuals accommodate more strongly after a positive expectation violation and that individuals immunise more strongly after a negative expectation violation. To the best of our knowledge, assimilation has not yet been investigated in the context of the optimism bias. We conducted an exploratory analysis, but as assimilation is a process contributing to expectation persistence, we suspected that individuals report stronger assimilation in response to negative compared with positive expectation violation.

Most research on predictors of coping strategies with expectation violation has been conducted on the degree of expectation violation (Burgoon, 2016; Roese & Sherman, 2007). However, previous theories and studies came to partly contradictory conclusions or results. According to the delta-rule, which is one of the best-known learning rules, it can be assumed that large discrepancies are more difficult to ignore and generate larger expectation changes (i.e., accommodation; Rescorla & Wagner, 1972). Contrary, small discrepancies can be easier ignored and are more likely to result in immunisation. This assumption has been empirically supported several times in learning research (e.g., Nassar et al., 2010). Other approaches agree on the assumption that small discrepancies are easily ignored—but suggest that large discrepancies might also be easily ignored (Roese & Sherman, 2007). When experiencing a large expectation violation, individuals might immunise by engaging in subtyping, in which they regard the disconfirming information as an exception (Filipowicz et al., 2018; Seta & Seta, 1994). Subtyping is mainly shown when additional clue stimuli facilitate a differentiation of the expectation-disconfirming situation from typical situations (Pinquart, Panitz, et al., 2021). Based on the numerous findings for the delta-rule, we assumed that a large expectation violation is likely to lead to stronger accommodation. Consistent with all theories mentioned above, we assumed that smaller expectation violation is easier to ignore and therefore leads to stronger immunisation.

Expectations also differ in their relevance for individuals—in education, some future test results are more important than others and consequently more essential for the academic self-concept. Individuals prefer information that confirms the self-concept because of an "in-built preference for things that are predictable, familiar, stable, and uncertainty reducing" (Swann, 1983, p. 34). Therefore, people are less likely to change an expectation that is closely tied to their self-concept. The self as a cognitive

system defends itself from information threatening its consistency (Baumeister, 1995). Some former results support this suggestion and showed that high relevance of an expectation leads to stronger immunisation against disconfirming feedback (Greve & Wentura, 2003; Stussi et al., 2018). In addition, research on goal (dis)engagement found that individuals cannot easily disengage from goals with a central place in their hierarchical goal structure (Brandtstädter & Rothermund, 2002). Negative feedback has a potentially threatening effect on the academic self-concept; therefore, individuals are likely to engage in coping aimed at protecting their self-concept (Greve & Wentura, 2003). Thus, we hypothesised that immunisation will be reported more strongly when individuals rate a disconfirmed educational expectation as highly relevant compared with individuals rating the expectation as less relevant.

Personality dispositions

Additional to situational characteristics, the ViolEx Model assumes that individual differences are likely to influence an individuals' use of coping strategies (Gollwitzer et al., 2018). To address the lack of empirical studies on dispositional predictors of coping with expectation violations, we included the dispositional preference for assimilation, accommodation, and immunisation in our study. Although situational aspects influence the way individuals cope in a certain situation, dispositional preferences increase the likelihood of dealing with a stressor in a certain way (Connor-Smith & Flachsbart, 2007; Lazarus & Folkman, 1984). This is based on the belief that people do not make completely new decisions about how to deal with a situation each time, but use a preferred set of coping strategies (Carver et al., 1989). A dispositional preference for a coping strategy is a general tendency to use one or the other strategy in everyday life. We assumed that the respective dispositional preference influences the situational use of assimilation, accommodation, and immunisation after expectation violation.

A violation of educational expectations leads to discrepancies and uncertainty about the academic self-concept. Although it can be assumed that all individuals strive to avoid self-concept discrepancies, inconsistencies stress individuals to different extents (Kruglanski, 2013). These individual differences partly result from a varying need for cognitive closure. Need for cognitive closure is defined as "the desire for a definite answer on some topic, any answer as opposed to confusion or ambiguity" (Kruglanski, 1989, p. 13). This is aimed to simplify a complicated world, and people differ in the extent to which they are dispositionally motivated to cognitively structure their world in a simple and unambiguous way (Neuberg & Newsom, 1993). Need for cognitive closure probably also relates to how people cope with expectation violation and the resulting cognitive dissonance. Consistent with former research, we expect people to strive to reduce feelings of uncertainty about themselves, but to differ in terms of the strategies to cope with it (Strojny et al., 2016). In theory, individuals with a high need for cognitive closure should be more likely to ignore and resist discrepant feedback and therefore to show assimilative or immunising coping strategies after expectation violation (Neuberg & Newsom, 1993). Consistent with this, a higher need for cognitive closure is linked to less attention and worse memory for behaviour that is inconsistent with an initial expectation (Dijksterhuis et al., 1996). We suggested that a higher need for cognitive closure is positively correlated with expectation-persisting strategies (assimilation, immunisation), and negatively with expectation change (accommodation).

As a final potential predictor, we included optimism in our study. Optimism has been defined as the tendency to overestimate future positive events and underestimate future negative events (Weinstein, 1980). Optimism and expectations have in common that they are both beliefs about the likelihood of future events. In an educational context, optimistic grade expectations are often accurate predictors of the actual performance resulting from self-knowledge and informed optimism (Svanum & Bigatti, 2006). But optimism does not always lead to accurate predictions: People tend to update their beliefs to a greater extent after receiving positive information compared with receiving negative information, which is often referred to as optimism bias (Garrett & Sharot, 2017; Sharot et al., 2011). Kube and colleagues (Kube & Glombiewski, 2020; Kube & Rozenkrantz, 2020) have provided stronger insights into the relation between expectation violation, optimism bias, and immunisation in clinical research. When individuals are strongly optimistic, they will be prone to immunise their expectations against worse-than-expected events. Interestingly, some previous studies found that optimism related to stronger expectation persistence after both better- and worse-than-expected outcomes (Geers & Lassiter, 2002; Morton et al., 2011). We therefore assumed that higher optimism is linked to stronger immunisation tendencies after expectation violation. In addition, we aimed to explore how optimism is linked to accommodation and assimilation in the context of educational expectations.

Methods

The study was approved by the local ethics committee (reference number 2020-81k-rev). All participants confirmed written informed consent and were treated in accordance with the ethical guidelines of the German Psychological Society and according to the Declaration of Helsinki. The study was pre-registered at Open Science Framework: https://osf.io/6vxk7.

Participants

We conducted a priori power analysis for the total model using G*Power. We expected small effects of our experimental manipulations (multivariate analysis of covariance [MANCOVA]: $f^2 = 0.02$; alpha = .05; power: .80) and received a minimum sample size of 368 participants. As we expected some dropouts and outliers, we stopped collecting data after 450 participants completed the questionnaire. Participants were recruited via university email lists inviting them to participate in our study. Students with good German language skills and who were at least 18 years of age were included. Participants received course credit or the chance to participate in a raffle for vouchers as compensation.

Randomisation and procedure

We conducted the 45 minutes online study with a 2 (valence of expectation violation: positive vs. negative) × 2 (degree of expectation violation: large vs. small) × 2 (relevance of the expectation: high vs. low) experimental design. Participants were randomly assigned to one of the eight experimental groups via computer-based randomisation. Participants did not know about the assignment to different groups. Data were collected in January and February 2021 via SoSci Survey in German language.

Analogy test. After asking for demographic data and personality dispositions, participants were introduced to the analogy solving task. The analogy task is a familiar task from recruitment tests, but participants are not expected to have extensive previous experience. This makes it possible to provide credible feedback. The credibility of the feedback is also enhanced by the fact that the difficulty of the tasks can be manipulated very easily. Participants received instructions and examples to ensure that they understood the task. Afterwards, participants completed a test trial and received accurate feedback on their performance. Participants received final instructions and were informed that there are three blocks with three analogy tasks each. Within each of the three tasks, 3 points could be achieved. Participants earned 1 point if they stated an analogy correctly. A total of 27 points were possible, and 9 points could be earned per block. The participants were asked before each block how many points they expect to earn in the next three tasks. An example of the analogy task can be found in the supplementary material.

Manipulations and cover story

Before the first trial. The study was advertised as an investigation to validate a positive correlation between an analogy-solving test and academic performance. Participants received the information that analogy tasks are used in English-speaking countries to predict academic performance and that our aim is to test this assumption in Germany. To match the personality trait questions with our cover story, participants were told that we were asking about certain traits to identify confounding variables that might affect the relationship between academic success and test performance. Our first manipulation referred to the relevance of the study. Half of the participants received the information that the test predicted academic performance across various study fields (high relevance). The other half received the information that the test predicted academic performance only for informational scientists (low relevance for non-information scientists).

First trial and generation of expectations. Half of the participants in the high-relevance condition as well as half of the participants in the low-relevance condition had to solve an easy test trial to raise positive expectations. Afterwards, participants received the information that the difficulty does not vary between the analogies and that former participants achieved on average 23 (±2.8) of 27 points overall. The other half of the participants had to solve a difficult test trial to raise negative expectations. These participants also received the information that the difficulty does not vary between the analogies, but were told that former participants achieved on average 9 (±2.8) of 27 points overall. After the test trial, participants started the first block with three trials and solved easy (negative valence group) versus difficult (positive valence group) analogies. Subsequently, they received standardised feedback explaining that their performance was above average (negative valence group) or below average (positive valence group) in order to confirm the respective positive or negative expectations. We conducted a pre-test with 12 persons in which all participants reported that the feedback was credible and that they were more uncertain about the more difficult analogies, but they did not feel the difficulty manipulation was obvious as we used similar word topics within all analogy tasks.

Second trial and expectation violation. In the second block that followed, the tasks were changed between the groups in order to create an expectation violation. The participants in the negative valence group now received the more difficult tasks and contrary, the participants in the positive valence group now received the easier tasks. Afterwards, the participants received standardised feedback according to the valence manipulation: The participants in the negative valence group received feedback that they had performed below average, and the participants in the positive valence group received feedback that they had performed above average. In addition, we manipulated the degree of expectation violation within the performance feedback. Participants in the negative valence group received either the information that their performance was slightly below or strongly below the average. Participants in the positive valence group received the

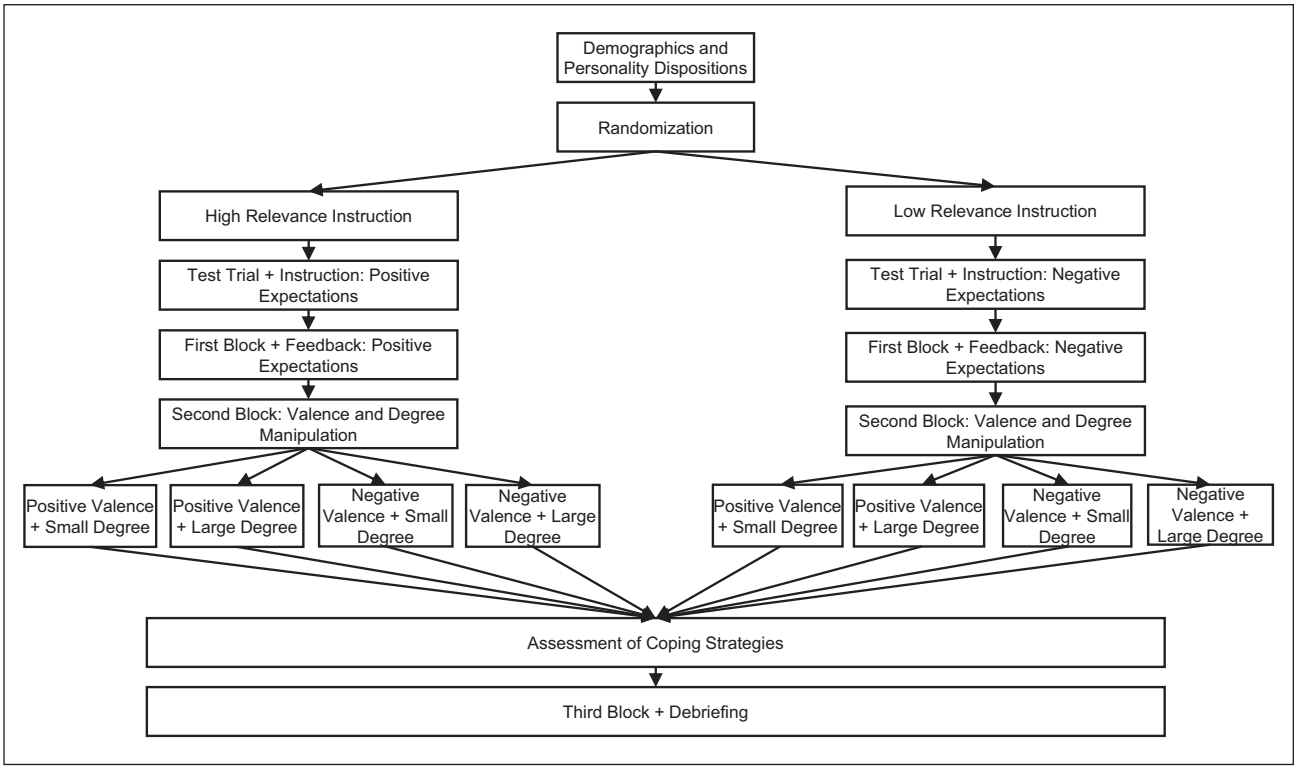

Figure 1. Flowchart of Randomisation Procedure and Manipulation.
The figure explains the randomisation procedure, when the manipulations occurred and the assignment to the eight experimental groups.

information that their performance was either slightly or strongly above the average.

Coping with expectation violation and last trial. After receiving expectation-disconfirming feedback, participants were asked how they coped with the disconfirming feedback. To match the questions about coping with expectation violations with our cover story, we let participants know that we would like to make the test available for self-assessment after a successful validation and that we are interested in reasons for discrepancies. After stating their expectations for the next block, all participants received a difficult trial. As we were interested in their tendency to show assimilative behaviour, we assessed how long they tried to solve the analogy. The last analogy of the study was an easy one to finish the study with a success and with good feelings. Afterwards, participants received information about the true intentions of the study. Figure 1 illustrates all manipulations and the entire study procedure.

Measures

Socio-demographics. We asked participants about their age, their gender, their field of study, their current semester, and their grade point average. The last information was used to maintain the cover story of investigating a correlative relationship between academic performance and the analogy solving test.

Manipulation checks. To ensure that we manipulated the valence of expectation violation and not the participants' generalised self-efficacy beliefs (GSEB), we measured GSEB before and after the experimental manipulation via Allgemeine Selbstwirksamkeit Kurzskala (ASKU) by Beierlein et al. (2012). The scale consisted of three items (e.g., "I can rely on my abilities in difficult situations.") and ranged from 1 = *strongly disagree* to 7 = *strongly agree*. A reliability analysis for our study revealed a good internal consistency with $\alpha = .84$ before experimental manipulation and $\alpha = .88$ after experimental manipulation.

In addition, we checked whether we were able to generate positive expectations before the expectation violation in the negative valence groups and negative expectations before the expectation violation in the positive valence groups. Therefore, we asked participants about their performance expectations before each block with possible scores between 0 (no analogy solved) and 9 (all analogies solved).

To ensure that the perceived relevance differed according to the relevance instruction, we asked them about how relevant the test is for their academic success with one item ("The test is potentially relevant for me because the test result was related to higher study success in my field

in former studies.") on a 7-point scale ranging from 1 = *strongly disagree* to 7 = *strongly agree*.

Optimism. We measured optimism with the German version of the Life-Orientation-Test (LOT-R; Glaesmer et al., 2008). The scale consists of 10 items out of which three assessed dispositional optimism (e.g., "Even in uncertain times, I usually expect the best."). We used a 7-point rating scale which ranged from 1 = *strongly disagree* to 7 = *strongly agree*. In our study, Cronbach's alpha was acceptable with $\alpha = .78$.

Need for cognitive closure. We measured need for cognitive closure with the 16NCCS adapted by Schlink and Walther (2007). The scale consists of 16 items, and we used a 7-point rating scale which ranged from 1 = *strongly disagree* to 7 = *strongly agree*. Cronbach's alpha was good with $\alpha = .84$.

Dispositional coping strategies. We measured the dispositional preference for assimilation, accommodation, and immunisation with three scales adapted from Pietzsch and Pinquart (2020). Accommodation (e.g., "I adjust my expectations when it seems like they are not going to be met.") and immunisation scales (e.g., "If I experience something that does not fit well with my expectations, I consider that to be an exception.") consist of six items each, and the assimilation scale (e.g., "I do a lot to make sure my expectations are met.") consists of seven items. For all three scales, we used a 7-point rating scale which ranged from 1 = *strongly disagree* to 7 = *strongly agree*. Cronbach's alpha was very good for assimilation with $\alpha = .91$, good for accommodation with $\alpha = .82$, and acceptable for immunisation with $\alpha = .73$ and therefore comparable to former psychometric properties (Eller, 2020; Pietzsch & Pinquart, 2020).

Situational coping strategies. We assessed the three different coping strategies after expectation violation with a self-developed 23-items scale (see supplementary material). Eight items captured immunisation (e.g., "The score does not reflect my actual performance level.") with Cronbach's alpha of $\alpha = .70$, eight items captured assimilation (e.g., "In the next test block, I will concentrate on meeting my expectations with my performance.") with Cronbach's alpha of $\alpha = .75$ and seven items captured accommodation (e.g., "For the next block of tests, I will adjust my expectation to match my actual performance.") with Cronbach's alpha of $\alpha = .84$. For all three coping strategies, we used a 7-point rating scale which ranged from 1 = *strongly disagree* to 7 = *strongly agree*.

Other measures (Actual assimilation, actual expectation, satisfaction). To validate the self-developed scale of situational coping strategies after expectation violation, we used a secondary measure for each coping strategy. Secondary to the immunisation coping scale, we asked participants how satisfied they were with their test performance before the expectation violation and after the expectation violation with one item ("How satisfied are you with your performance in the first/second block?") on a 7-point scale ranging from 1 = *not satisfied at all* to 7 = *very satisfied*. A high satisfaction after negative expectation violation is an indicator of immunisation against the feedback. Secondary to the accommodation coping scale, we asked participants about their expected performance for the next task after expectation violation and compared it to the expectations before expectation violation. Secondary to the assimilation coping scale, we measured the time participants spent with solving the first difficult trial after expectation violation.

Data analysis

Data analysis was performed using IBM SPSS Statistics 27. A MANCOVA was performed for the overall model. The model was calculated as specified in the preregistration with the minimum level of significance $\alpha = 0.05$ (confidence interval of 95%). The bivariate associations between study variables can be found in the supplementary material.

Results

Preliminary data analysis and participants

First, we examined whether there was a pattern in missing data (Missing Not At Random, Missing At Random, or Missing Completely At Random). Our study contained 0.09% missing data. Because the value was less than 5% for each variable, we assumed that the data were missing completely at random and decided to exclude the missing values pairwise. Univariate outliers were detected via box-whisker plots and multivariate outliers via Mahalanobis Distance ($p < .001$) and excluded the outliers only from the respective analysis.

We excluded participants who were informational scientists in the low-relevance groups (seven participants) and participants who did not experience an expectation violation (four participants) because of expecting 0 points in the negative valence group or 9 points in the positive valence group. Our final sample consisted of 439 participants. The participants were mainly young adults ($M = 22.90$, $SD = 4.18$), identified with female gender ($n = 343$ females, $n = 89$ males, $n = 7$ diverse), and studied psychology ($n = 138$), humanities ($n = 120$), natural science ($n = 128$), teaching ($n = 35$), or other study fields ($n = 17$).

Manipulation checks

Generalised self-efficacy beliefs. We measured GSEB before and after expectation violation. A *t*-test for dependent

Table 1. Means and Standard Deviations of Coping Strategies Divided by Group.

	Valence	Relevance	Degree	Assimilation		Accommodation		Immunisation	
				M	*SD*	*M*	*SD*	*M*	*SD*
Total				4.45	0.90	4.45	1.09	4.29	0.89
Group 1	0	1	0	4.52	0.78	4.40	1.11	3.99	0.88
Group 2	0	1	1	4.57	0.78	4.46	1.22	4.55	0.89
Group 3	0	0	0	4.59	0.96	4.30	1.07	4.19	0.79
Group 4	0	0	1	4.59	0.90	4.60	1.12	4.64	0.77
Group 5	1	1	0	4.17	0.97	4.42	1.11	4.19	0.98
Group 6	1	1	1	4.42	0.93	4.50	0.99	4.21	0.83
Group 7	1	0	0	4.31	0.79	4.49	0.90	4.43	0.86
Group 8	1	0	1	4.40	1.02	4.45	1.24	4.06	0.91

SD: standard deviation.
[a]0/1 = negative/positive valence of expectation violation.
[b]0/1 = low/high relevance of the expectation.
[c]0/1 = small/large degree of expectation violation.

samples remained non-significant, $t(437)=0.26$, $p=.79$, indicating that, as desired, we did not manipulate GSEB. In addition, to ensure that the effects of the negative valence and positive valence groups did not neutralise each other, we retested the groups individually. In the negative valence group, the second assessment of GSEB ($M=5.37$, $SD=0.98$) was even higher than the first assessment ($M=5.32$, $SD=0.99$), but both means did not differ significantly, $t(222)=-1.25$, $p=.21$, $d=0.05$. In the positive valence group, GSEB was slightly higher at the first assessment of ($M=5.41$, $SD=0.92$) than at the second assessment ($M=5.34$, $SD=1.01$), but again both means did not differ significantly, $t(214)=1.41$, $p=.16$, $d=0.07$. Therefore, we can conclude that we did not manipulate the GSEB of participants and that the obtained results most likely refer to the valence manipulation.

Valence. To ensure that we were able to raise positive expectations before the expectation violation in the negative valence group and negative expectations in the positive valence group, we compared the participants' expected achievement before block 1 and block 2 between the groups with independent *t*-tests. Expectations before block 1, $t(421)=11.90$, $p<.001$, $d=1.13$, and block 2, $t(424)=11.36$, $p<.001$, $d=1.09$, differed significantly between the groups. Participants in negative valence groups expected significantly higher scores ($M_1=6.79$, $SD_1=1.52$; $M_2=6.33$, $SD_2=1.58$) than participants in positive valence groups ($M_1=4.93$, $SD_1=1.76$; $M_2=4.50$, $SD_2=1.78$). Our manipulation resulted in the intended effects because we created positive achievement expectations in groups with negative valence of expectation violation and negative achievement expectations in groups with positive valence of expectation violation.

Relevance. We intended to generate different assumptions among participants about how relevant the test was to their study success. To verify this manipulation, we compared the groups with high relevance to those with low relevance with an independent *t*-test, $t(433)=-8.01$, $p<.001$, $d=0.77$. Our manipulation caused the intended effects because participants in the high relevance groups rated the relevance significantly higher ($M=3.58$, $SD=1.77$) than participants in the low-relevance groups ($M=2.30$, $SD=1.55$). Nevertheless, the mean in the high relevance group ($M=3.58$) can be considered as medium on the 7-point scale and thus does not indicate a perceived high relevance.

Total model

A MANCOVA was performed to examine the total model including all collected variables. Here, we examined the effect of valence, relevance, and degree on the situational coping strategies assimilation, accommodation, and immunisation. Personality traits (optimism, need for cognitive closure, and dispositional coping preferences) were included in the model as covariates. In addition, we assessed the interaction effects of all predictors. Descriptive results can be found in Table 1.

First of all, we analysed the main effects of the total model. We predicted that a positive valence of expectation violation results in higher accommodation and that a negative valence of expectation violation results in higher immunisation. Although valence was found to be a significant predictor in the total model, $\Lambda=0.97$, $F(3, 382)=3.39$, $p=.02$, $\eta_p^2=0.03$, it neither predicted accommodation, $F(1, 384)<0.001$, $p=.97$, $\eta_p^2<0.01$, nor immunisation, $F(1, 384)=1.04$, $p=.22$, $\eta_p^2<0.01$, significantly. Instead, valence was a significant predictor of assimilative coping, $F(1, 384)=4.70$, $p=.01$, $\eta_p^2=0.02$, indicating that participants showed higher assimilation after perceiving a negative expectation violation ($M=4.59$, $SD=0.83$) compared with positive expectation violation ($M=4.36$, $SD=0.92$).

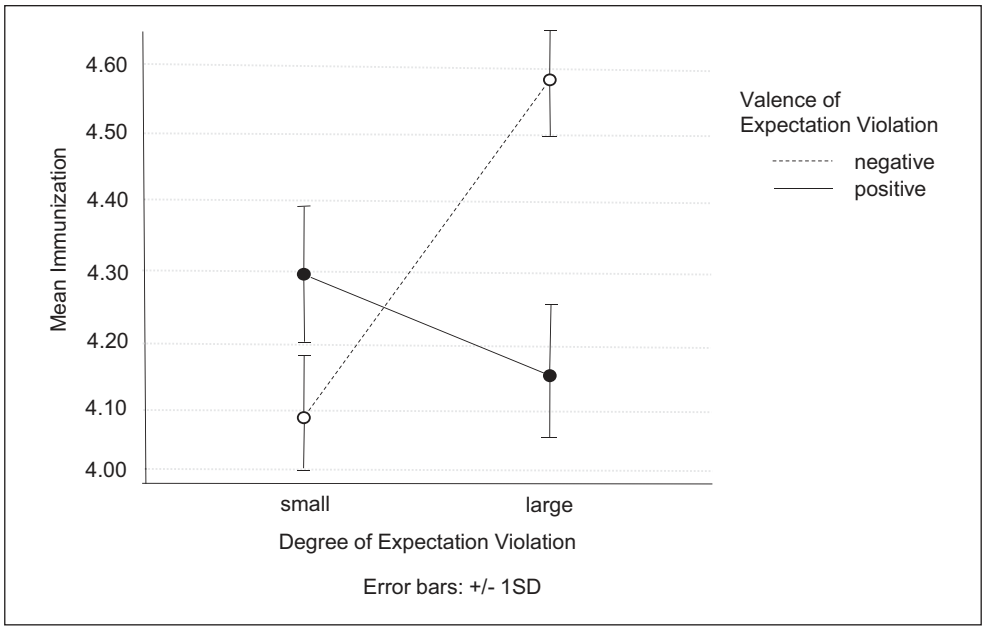

Figure 2. Interaction Effect Between Valence and Degree on Immunisation.
Immunisation was measured on a 7-point-Likert-type scale. Error Bars: ± 1 *SE*.

Furthermore, we assumed that a large degree of expectation violation results in stronger accommodation and that a small degree of expectation violation results in stronger immunisation. Degree of Expectation violation was not a significant predictor in our total model, $\Lambda = 0.99$, $F(3, 382) = 1.77$, $p = .15$, $\eta_p^2 = 0.01$, and neither predicted accommodation, $F(1, 384) = 0.78$, $p = .38$, $\eta_p^2 < 0.01$, nor assimilation, $F(1, 384) = 0.98$, $p = .32$, $\eta_p^2 < 0.01$. As assumed, degree of expectation violation was a significant predictor of immunisation, $F(1, 384) = 4.16$, $p = .04$, $\eta_p^2 = 0.01$, but contrary to our assumption: A large degree of expectation violation led to stronger immunisation ($M = 4.38$, $SD = 0.87$) than a small degree ($M = 4.19$, $SD = 0.84$). Finally, we assumed that high relevance of the expectation significantly predicts stronger immunisation. Relevance was not a significant predictor in our model, $\Lambda = 0.99$, $F(3, 382) = 0.95$, $p = .42$, $\eta_p^2 = 0.01$, and contrary to our assumption, high relevance did not predict stronger immunisation, $F(1, 384) = 2.46$, $p = .12$, $\eta_p^2 = 0.01$. In addition, relevance neither predicted accommodation, $F(1, 384) = 0.07$, $p = .80$, $\eta_p^2 < 0.01$, nor assimilation, $F(1, 384) = 0.43$, $p = .51$, $\eta_p^2 < 0.01$.

In the next step, we examined possible interaction effects of all three predictors. We neither found a significant interaction effect for valence and relevance, $\Lambda = 1.00$, $F(3, 382) = 0.63$, $p = .60$, $\eta_p^2 = 0.01$, degree and relevance, $\Lambda = 0.99$, $F(3, 382) = 1.18$, $p = .32$, $\eta_p^2 = 0.01$, nor valence and degree and relevance, $\Lambda = 0.99$, $F(3, 382) = 1.41$, $p = .24$, $\eta_p^2 = 0.01$. However, we found a significant interaction effect of valence and degree, $\Lambda = 0.95$, $F(3, 382) = 6.81$, $p < .001$, $\eta_p^2 = 0.05$. Further analysis revealed that the interaction between valence and degree was a significant predictor of immunisation, $F(1, 384) = 16.84$, $p < .001$, $\eta_p^2 = 0.04$. In more detail, the interaction of a large degree of expectation violation and negative valence ($M = 4.58$, $SD = 0.84$) led to stronger immunisation (see Figure 2).

In addition, we analysed the statistical effects of personality traits as covariates on the three coping strategies. We assumed that higher optimism predicts stronger immunisation tendencies after expectation violation. Optimism was not found to be a significant predictor in our total model, $\Lambda = 0.99$, $F(3, 382) = 0.87$, $p = .46$, $\eta_p^2 = 0.01$, and did not predict immunisation, $F(1, 384) = 0.25$, $p = .62$, $\eta_p^2 < 0.01$. Regarding need for cognitive closure, we assumed effects on all three coping strategies: High cognitive closure was assumed to result in higher expectation persistence (i.e., assimilation and immunisation) and to result in lower expectation change (i.e., accommodation). Contrary to our assumption, cognitive closure was not a significant predictor in our total model, $\Lambda = 0.99$, $F(3, 382) = 1.92$, $p = .13$, $\eta_p^2 = 0.02$. High cognitive closure did not predict immunisation, $F(1) = 0.78$, $p = .38$, $\eta_p^2 < 0.01$, and was only close to be a significant predictor of assimilation, $F(1, 384) = 3.52$, $p = .06$, $\eta_p^2 = 0.01$. Contrary to our assumption, high need for cognitive closure predicted stronger accommodation, $F(1, 384) = 4.05$, $p = .05$, $\eta_p^2 = 0.01$. Finally, we assumed that the dispositional coping preferences for assimilation, accommodation, and immunisation would be significant predictors of the respective situational coping strategies after expectation violation. We confirmed this assumption with regard to assimilation, $F(1, 384) = 13.95$, $p < .001$, $\eta_p^2 = 0.04$, and accommodation, $F(1, 384) = 12.29$, $p = .001$, $\eta_p^2 = 0.03$.

Associations of dispositional immunisation with situational immunisation were in the expected direction but slightly failed statistical significance, $F(1, 384) = 3.71$, $p = .06$, $\eta_p^2 = 0.01$.

Overall, analysis of the total model revealed medium effect sizes for assimilation, $F(12, 384) = 3.72$, $p < .001$, $\eta_p^2 = 0.10$, accommodation, $F(12, 384) = 2.44$, $p < .01$, $\eta_p^2 = 0.07$, and immunisation, $F(12, 384) = 2.40$, $p < .001$, $\eta_p^2 = 0.10$.

Additional analyses

Assimilation. The secondary measure of assimilation referred to the time participants spent to solve a difficult analogy directly after the expectation violation. We used linear regression to reveal the relation between assimilative behaviour and reported assimilation, but without obtaining a significant result, $F(1, 406) = 0.21$, $p = .64$, $R^2 < 0.01$, even when separating between negative valence, $F(1, 204) = 0.66$, $p = .42$, $R^2 < 0.01$, and positive valence, $F(1, 200) = 3.52$, $p = .06$, $R^2 = 0.02$. Thus, in our study, we could not relate assimilative behaviour to reported assimilation.

Accommodation. The secondary measure of accommodation referred to the actual change in expectations after feedback. We used linear regression to capture how expected scores changed through expectation violation. Overall, expectations remained stable, $F(1, 432) = 866.51$, $p < .001$, $R^2 = 0.67$, $f^2 = 2.03$, despite contradictory feedback. The expected scores before expectation violation strongly predicted the scores after expectation violation, also when separating for negative, $F(1, 221) = 486.74$, $p < .001$, $R^2 = .70$, $f^2 = 2.28$, and positive valence, $F(1, 209) = 195.28$, $p < .001$, $R^2 = 0.48$, $f^2 = 0.92$. We further investigated if the actual expectation change was related to the reported accommodative coping. We found significant associations between actual expectation change and reported accommodative coping for positive, $F(1, 206) = 7.48$, $p < .01$, $R^2 = 0.04$, $f^2 = 0.04$, and negative valence, $F(1, 219) = 28.55$, $p < .001$, $R^2 = 0.12$, $f^2 = 0.13$. We can therefore conclude that expectations tended to persist in our study and that change of expectation was significantly related to reported accommodation after expectation violation.

Immunisation. The secondary measure of immunisation referred to the participants' satisfaction with their own performance. We expected participants with low immunisation to show less change in satisfaction. We used linear regression to reveal the relation between reported immunisation and actual change of satisfaction with the own performance, $F(1, 434) = 0.78$, $p = .38$, $R^2 < 0.01$, and did not obtain a significant result. When separating for positive, $F(1, 211) = 0.81$, $p = .37$, $R^2 < 0.01$, and negative valence, $F(1, 221) = 3.15$, $p = .08$, $R^2 = 0.01$, results remained non-significant. Thus, we did not find a significant relation between participants' change of satisfaction with their own performance and reported immunisation.

Discussion

Our experimental study assessed how situational characteristics and personality dispositions affect coping with a single expectation violation in an educational context. We found valence, degree of expectation violation, and the interaction of negative valence and large degree of an expectation violation to be significant situational predictors of the total model. In addition, the personality dispositions need for cognitive closure and coping preferences predicted coping with expectation violations. Our study was able to contribute to a better understanding of possible predictors of coping with an expectation violation. The overall model showed a medium fit for assimilation, accommodation, and immunisation. Brandtstädter and Greve (1994) as well as Pinquart, Panitz, et al. (2021) assumed that personal and situational conditions are crucial in determining which coping strategy is used by an individual. In this regard, our study provides important new insights.

Situational characteristics

Among situational variables, we identified valence as a predictor of assimilation and degree of expectation violation as a predictor of immunisation. Concerning valence, we assumed an optimism bias in line with previous literature (e.g., Chowdhury et al., 2014; Garrett & Sharot, 2017). We suspected stronger accommodation after better-than-expected feedback and stronger immunisation after worse-than-expected feedback. Both assumptions were not confirmed in our study. The expected achievements for the next block were highly stable despite expectation violation, which might be explained by stronger tendencies for assimilation. After receiving expectation-violating negative feedback, participants reported stronger assimilative coping compared with receipt of positive feedback. Assimilation results from a preventive and corrective focus in which self-improvement attempts to meet one's standards, goals, and expectations (Brandtstädter & Rothermund, 2002). In our study, individuals may have sought to compensate for a worse reality by making a strong effort to meet their positive achievement expectations. Holding on to positive achievement expectations despite a single negative feedback can be considered adaptive for the individual and plausible after long-term previous experience on achievement feedback. Although we did not evaluate the effectiveness of the certain coping strategies, previous studies indicate that coping strategies aimed at

fulfilling positive achievement expectations are desirable in the academic context (e.g., Hall et al., 2006).

Contrary to our assumption, the degree of expectation violation did not predict accommodation. Furthermore, the degree predicted immunisation differently than assumed: Contrary to the delta-rule (Rescorla & Wagner, 1972), it appeared that participants immunised more strongly when the expectation violation was large. We previously mentioned that this is according to other expectation-related theories (e.g., Roese & Sherman, 2007). Furthermore, this finding is according to results of clinical research investigating expectation violation in pain disorders (Hird et al., 2019) and depression (Kube et al., 2021). The students may have regarded the feedback as an exception from the rule, which might also be related to the special context. Regarding their academic success, individuals rely strongly on grades and direct feedback from university staff but are not used to receive feedback after participating in an online study. Thus, our feedback was inconsistent with other feedback on academic success, and participants may find it easier to consider the particular circumstances as causative of the outcome and are therefore more likely to subtype (Deutsch & Fazio, 2008). The tendency to subtype can be linked to a stronger need for cognitive closure (Kruglanski & Freund, 1983) and also to the desire to maintain the self-concept (Olson & Fazio, 2004).

In addition, the effect of degree of expectation violation on immunisation seems to be strongly related to valence: Stronger immunisation was found for negative and highly discrepant feedback. The assumption that an individual's self-esteem can be protected against threatening information through coping is one of the few validated assumptions in psychology (e.g., Leary & Baumeister, 2000). Immunising processes involve a self-protective denial of potential self-discrepant negative information and events (Brandtstädter & Greve, 1994). Therefore, we conclude that individuals immunise more strongly after a large negative expectation violation for self-protective reasons. Individuals immunise particularly often when discrepancies are directed against central elements of their self-concept to maintain consistency and self-esteem (Swann, 1987). Several previous experimental studies already showed that individuals devalued self-discrepant feedback (e.g., Swann & Read, 1981) or adjusted self-discrepant information according to the self-concept (Greve et al., 2009). Because immunisation is facilitated by feedback that is considered as unreliable, we conclude that a large degree of expectation violation results in stronger immunisation mainly for two reasons: First, because strong discrepancies often trigger subtyping, and second, to protect the academic self-concept after receiving strongly negative achievement feedback.

In line with these findings, we assumed that these self-protective mechanisms also emerge and result in higher immunisation when an expectation is highly relevant, but we did not find an effect of relevance on immunisation. However, our manipulation check showed that we could not induce high relevance, but compared medium relevance with low relevance. As the expectation was not highly relevant for most participants, the academic self-concept was not involved to the extent we had intended. Personal importance and centrality are decisive mechanisms for the responses we hypothesised (Brandtstädter & Rothermund, 2002), but we did not induce them to the intended extent. Thus, we cannot conclusively assess whether high relevance is a predictor of coping with expectation violations.

Personality dispositions

Regarding personality dispositions, the results were more promising because most of the included variables predicted the use of particular coping strategies. Dispositional assimilation preference and dispositional accommodation preference significantly predicted the respective situational coping strategy. Furthermore, dispositional immunisation preference almost predicted stronger immunisation. We suppose that the acceptable internal consistencies of dispositional immunizations scale and actual immunisation scale hampered a significant result. The connection was also difficult to find because both scales suffer from the problem of measuring an unconscious process (Brandtstädter, 2007), although results of immunisation are generally accessible via self-report (Pinquart, Endres, et al., 2021). The measurement of coping is somehow challenging because some coping processes might work differently depending on whether individuals use them in a conscious and introspectively accessible way. Nevertheless, the results are congruent with our assumption and previous theories stating that situational coping strategies are predicted by dispositional coping preferences (Haratsis et al., 2015).

Our assumption that a higher need for cognitive closure leads to stronger assimilation was nearly confirmed. In the assimilative mode, an individual's cognitive system is strongly in search for cognitive content supporting the expectation (Brandtstädter & Rothermund, 2002). But contrary to our assumptions, individuals with a higher need for cognitive closure also reported stronger accommodation tendencies. This seems contradictory, but might be explained consistently with assimilation: When confronted with new and discrepant information, an individual with a high need for cognitive closure seeks clarity to reduce uncertainty. An individual can seek clarity either in the direction of the already existing expectation (Neuberg & Newsom, 1993), or in the direction of the new information to avoid further expectation-discrepant outcomes. Although this information is new, it provides certainty and may satisfy an individual's need for cognitive closure if the individual accepts the new information to be true. This

is supported by the finding that a high need for cognitive closure does not imply closed-mindedness (Kemmelmeier, 2015). Therefore, individuals may prefer to accept expectation-inconsistent information and a new, certain reality rather than an uncertain old one (Strojny et al., 2016). Future research should further investigate under which conditions need for cognitive closure promotes either assimilation or accommodation.

Regarding optimism, we did not find the suspected association to immunisation, even when including valence of expectation violation to investigate an optimistic bias. Furthermore, optimism did neither significantly predict assimilation nor accommodation in the total model. We were probably unable to identify optimism as a predictor because there was hardly any variance in the variable. Most participants considered themselves to be above average. This problem was also evident in previous studies, whereby dispositional optimism could not be found as a predictor (e.g., Korn et al., 2014; Kube & Glombiewski, 2020). A possible solution for future studies is the approach of Sharot and colleagues (2011), who considered that a dichotomous measurement of optimism seems to be more promising. We would advise a different operationalization of optimism in future studies to better assess the actual correlation to coping strategies. Furthermore, the relationship between personality dispositions like optimism and coping is also affected by situational cues: if a situation offers no cues suggesting a certain coping behaviour, the relationship between the disposition and coping should be stronger than in situations that provide strong cues in favour of an individual way of coping (Pinquart, Panitz, et al., 2021).

Limitations

To our knowledge, our study was the first to experimentally test the ViolEx Model with multiple predictors in an educational context. In doing so, we included numerous predictors that have not previously been associated with the interplay of the three coping strategies after expectation violation. This also results in some limitations.

First, it is important to note that although we included several potential predictors of coping with expectation violation in our study, these are not the only characteristics that influence assimilation, accommodation, and immunisation. For example, expectations, especially in the educational context, are usually strongly shaped by prior expectations and past experiences (Andrew & Hauser, 2011; Carolan, 2017), and the induced expectation must always be considered in the context of generalised expectations and other cognitions. This may influence the use of coping strategies beyond the controlled variables, leaving much variance unexplained and attenuating the effect of the experimental manipulation. Capturing the full complexity of coping with expectation violations in an achievement context is unlikely to be feasible experimentally; however, stepwise testing of promising predictors and their interaction can provide insight into which characteristics explain a larger amount of variance and are thus significant for coping with expectation violations. Future studies could investigate coping after expectation violation of less established expectations to strengthen the impact of manipulations.

Second, there were problems with our relevance manipulation because the perceived relevance in the high relevance group was only at an intermediate level overall. Therefore, the variable varied less than we intended, and a smaller mean difference ultimately results in a larger overlap of variance. Thus, it was hardly possible to find an effect here and to assess whether high relevance is a predictor of coping with expectation violations. In future studies, researchers should imply a manipulation that results in a stronger differentiation. For example, they could try to adjust the manipulation more clearly to the study field—but this also results in a restricted sample, e.g., consisting only of students of a particular field.

A third limitation is due to problems with the measurement procedures. There are only few established measurement instruments assessing the coping strategies proposed in the ViolEx Model, and also in our study the scales only in part revealed acceptable internal consistencies. This restricted reliability was especially evident for the scales dispositional immunisation, situational immunisation, and situational assimilation. Immunisation, as already discussed, is generally difficult to assess as an unconscious cognitive process (Brandtstädter, 2007). Thus, especially for the correlation between dispositional immunisation and actual immunisation, it is unclear whether a relationship exists or whether it was just failed to be detected due to restricted reliability.

Finally, there were only partly significant correlations between the reported coping strategies and the secondary measures. Although stronger reported accommodation was related to stronger actual expectation change, assimilation and immunisation did not show significant correlations with the secondary measures. Immunisation was not directly related to change in satisfaction. Satisfaction was more strongly related to actual feedback than to immunisation. Regarding assimilative behaviour and reported assimilation, we did not find that assimilative intentions are linked to actual time spent to solve the analogies. The scale for reported assimilation was much broader and did not specifically refer to time spent on solving analogies. By using an online experiment, the time spent on the webpage could also differ from the time actually spent on the analogy. We cannot verify whether participants even attempted to solve the analogy during the time spent on the page or were distracted in between. This can be better measured when studies under laboratory conditions are possible again.

Conclusions

Our study confirmed that coping with expectation violation is predicted by situational and dispositional factors in an educational context. This supports assumptions of the ViolEx Model with direct experiences and individual differences as decisive influences on the preferred coping strategy in a specific situation (Gollwitzer et al., 2018). Concerning individual differences, our study indicated that dispositional coping preferences strongly predict actual coping after an expectation violation. A high need for cognitive closure is in turn related to the search for clarity, regardless of whether this clarity refers to the persistence (i.e., assimilation) or change of expectations (i.e., accommodation). Here, cognitive closure appears to be a more flexible construct than previously assumed. Moreover, some results of our study are relevant for the protection of the academic self-concept. Optimists persist longer in their performance expectations, negative feedback causes stronger efforts, and when feedback is strongly negative, it leads to devaluing and ignoring the discrepant information. All these results serve to protect the academic self-concept from discrepancies after unexpected feedback and can be considered healthy adaptive coping after a single expectation violation in our study.

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Data accessibility statement

The study has been preregistered on Open Science Framework: https://osf.io/6vxk7.

Supplementary material

The supplementary material is available at: qjep.sagepub.com.

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Supplementary Material

1. Coping Scales

Assimilation

Die Schwierigkeit der Analogien sollte entsprechend der eigenen Erwartung gewählt werden können. (The difficulty of the analogies should be able to be chosen according to one's expectation.)

Ich werde im nächsten Testblock mehr darauf achten, dass meine vorherige Erwartung in Erfüllung geht. (I will pay more attention to meet my previous expectation in the next test block.)

Ich werde im nächsten Testblock meine Anstrengungen an meine Erwartungen angleichen. (I will align my efforts with my expectation in the next test block.)

Im nächsten Testblock werde ich mich so konzentrieren, dass meine Leistung meinen Erwartungen entspricht. (In the next test block, I will concentrate on meeting my expectations with my performance.)

Ich beabsichtige, meine Bemühungen mit meinen Erwartungen in Übereinstimmung zu bringen. (I intend to align my efforts with my expectations.)

Auch wenn mir im nächsten Testblock Analogien leichter oder schwerer fallen sollten, werde ich bemüht sein, meine Erwartungen zu erfüllen. (Even if analogies become easier or harder for me in the next test block, I will strive to meet my expectations.)

Im nächsten Testblock hätte ich gerne Aufgaben, die besser zu meiner Leistungserwartung passen. (In the next test block, I would like to have tasks that better match my performance expectations.)

Accommodation

Für den kommenden Testblock werde ich meine Erwartung an die erhaltene Rückmeldung anpassen. (For the upcoming test block, I will adjust my expectation to match the feedback I received.)

In Zukunft werde ich versuchen, meine Leistung realistischer einzuschätzen. (In the future, I will try to be more realistic about my performance.)

Ich werde meine Leistungseinschätzungen verbessern. (I will improve my performance estimates.)

Ich werde meine Leistungserwartungen an mich selbst überdenken. (I will reconsider the performance expectations I put on myself.)

Für den nächsten Testblock passe ich meine Erwartung an meine tatsächliche Leistung an. (For the next block of tests, I will adjust my expectation to match my actual performance.)

Ich beabsichtige, den Unterschied zwischen meiner Erwartung und meiner tatsächlichen Leistung zu reduzieren. (I intend to reduce the difference between my expectation and my actual performance.)

Immunization

Das Ergebnis im letzten Testblock war eine Ausnahme. (The result in the last test block was an exception.)

Das Ergebnis spiegelt nicht mein tatsächliches Leistungsvermögen wider. (The score does not reflect my actual performance level.)

Das Ergebnis im Test sagt nichts über meinen Studienerfolg aus. (The score on the test says nothing about my academic success.)

Das Testergebnis ist mir unwichtig. (The test result is not important to me.)

Ich glaube nicht, dass man mit diesem Test wirklich den Studienerfolg gut vorhersagen kann. (I don't think this test is really a good predictor of study success.)

Die Leistung im letzten Testblock war untypisch für mich. (The performance on the last block of tests was atypical for me.)

Das Ergebnis sagt nichts über mein tatsächliches logisches Denkvermögen aus. (The score says nothing about my actual reasoning ability.)

2. Results of Preregistered Hypotheses

- H1a. The higher an individual's optimism, the stronger an individual immunizes after expectation violation compared with low optimism.

Total: B = .07, $F(1, 431) = 2.02$, $p = .16$, $R^2 = 0.01$

Negative Valence: B = .02, $F(1, 221) = 0.10$, $p = .75$, $R^2 = 0.00$

Positive Valence: B = .12, $F(1, 211) = 3.06$, $p = 0.08$, $R^2 = 0.01$

- H2a. The higher an individual's need for cognitive closure, the stronger an individual assimilates after expectation violation compared with low need for cognitive closure.

B = .10, $F(1, 423) = 3.83$, $p = .05$, $R^2 = 0.01$

- H2b. The higher an individual's need for cognitive closure, the stronger an individual immunizes after expectation violation compared with low need for cognitive closure.

B = -.05, $F(1, 432) = 1.27$, $p = .26$, $R^2 = 0.00$

- H2c. The higher an individual's need for cognitive closure, the weaker an individual accommodates after expectation violation compared with low need for cognitive closure.

B = .13, $F(1, 429) = 7.88$, $p < 0.01$, $R^2 = 0.02$

- H3a. The higher an individual's dispositional immunization tendency, the stronger an individual immunizes after expectation violation compared with low dispositional immunization tendency.

B = .09, $F(1, 423) = 3.22$, $p = .07$, $R^2 = 0.01$

- H3b. The higher an individual's dispositional assimilation tendency, the stronger an individual assimilates after expectation violation compared with low dispositional assimilation tendency.

B = .20, $F(1, 419) = 17.18$, $p < .001$, $R^2 = 0.04$,

- H3c. The higher an individual's dispositional accommodation tendency, the stronger an individual accommodates after expectation violation compared with low dispositional accommodation tendency.

B = .16, $F(1, 425) = 11.45$, $p = .001$, $R^2 = 0.03$

- H4a. Individuals experiencing a positive valence of expectation violation react with higher accommodation compared with negative valence of expectation violation.

$T(431) = -0.21$, $p = .84$ ($M_{neg} = 4.44$, $SD_{neg} = 1.13$; $M_{pos} = 4.46$, $SD_{pos} = 1.06$)

- H4b. Individuals experiencing a negative valence of expectation violation react with higher immunization compared with positive valence of expectation violation.

$T(434) = 1.48$, $p = .14$ ($M_{neg} = 4.35$, $SD_{neg} = 0.87$; $M_{pos} = 4.22$, $SD_{pos} = 0.90$)

- H5a. Individuals experiencing a large expectation violation react with higher accommodation compared with small expectation violation.

$T(431) = -0.95$, $p = .34$ ($M_s = 4.40$, $SD_s = 1.05$; $M_L = 4.50$, $SD_L = 1.14$)

- H5b. Individuals experiencing a small expectation violation react with higher immunization compared with large expectation violation.

$T(434) = -2.08$, p = .04 ($M_s = 4.20$, $SD_s = 0.89$; $M_L = 4.37$, $SD_L = 0.88$)

- H6a: Individuals perceiving the expectation as highly relevant react with stronger immunization after expectation violation compared with low relevance.

$T(434) = 1.11$, $p = .27$ ($M_L = 4.33$, $SD_L = 0.86$; $M_H = 4.24$, $SD_H = 0.91$)

Combined Hypotheses.

- H7. If an individual perceives an expectation as highly relevant and this expectation is violated slightly and negatively, the individual reacts with stronger immunization compared to a less relevant expectation that is violated largely and positively.

$F(1, 435) = 0.60$, $p = .44$

- H8. Individuals experiencing a positive and large expectation violation react with stronger accommodation compared with negative valence and small degree.

$F(1, 432) = 0.60$, $p = .44$

- H9. The higher an individual's optimism and need for cognitive closure, the stronger an individual immunizes after expectation violation compared with low optimism and low need for cognitive closure.

$B_{Opt} = .05$, $B_{Cog} = -.04$, $F(2, 428) = 1.22$, $p = .30$, $R^2 = 0.00$

- H10. Individuals with high optimism who experience a small expectation violation react with stronger immunization compared with low optimism and large expectation violation.

$B_{Deg} = .10$, $B_{Opt} = .07$, $F(2, 430) = 2.63$, $p = .04$, $R^2 = 0.02$

- H11. Individuals with high optimism whose highly relevant expectations are violated react with stronger immunization compared with low optimism and low relevance.

$B_{Rel} = -.06$, $B_{Opt} = .07$, $F(2, 430) = 1.70$, $p = .18$, $R^2 = 0.01$

- H12. Individuals with high need for cognitive closure who experience a small expectation violation react with stronger immunization compared with low need for cognitive closure and large expectation violation.

$B_{Deg} = .10$, $B_{Cog} = -.06$, $F(2, 431) = 2.77$, $p = .06$, $R^2 = 0.01$

Exploratory Analyses.

E1. Optimism -> Accommodation

Total: $B = -.00$, $F(1, 428) = 0.00$, $p = .98$, $R^2 = 0.00$

Negative Valence: $B = .02$, $F(1, 219) = 0.09$, $p = .77$, $R^2 = 0.00$

Positive Valence: $B = .03$, $F(1, 210) = 0.21$, $p = .65$, $R^2 = 0.00$

Optimism -> Assimilation

Total: $B = .12$, $F(1, 423) = 5.68$, $p = .02$, $R^2 = 0.01$

Negative Valence: $B = .14$, $F(1, 217) = 4.20$, $p = .04$, $R^2 = 0.02$

Positive Valence: $B = .14$, $F(1, 206) = 3.95$, $p = .05$, $R^2 = 0.02$

E2. Valence of Expectation Violation (negative vs. positive) -> Assimilation

$T(425) = 2.90$, $p < .01$ ($M_{neg} = 4.56$, $SD_{neg} = 0.85$; $M_{pos} = 4.32$, $SD_{pos} = 0.93$)

E3. Degree of Expectation Violation (small vs. large) -> Assimilation

$T(425) = -1.13$, $p = .26$ ($M_S = 4.40$, $SD_S = 0.90$; $M_L = 4.50$, $SD_L = 0.90$)

E4. Relevance (low vs. high) -> Assimilation

$T(425) = 0.66$, $p = .51$ ($M_L = 4.48$, $SD_L = 0.92$; $M_H = 4.42$, $SD_H = 0.88$)

Relevance (low vs. high) -> Accommodation

$T(431) = 0.12$, $p = .90$ ($M_L = 4.46$, $SD_L = 1.09$; $M_H = 4.45$, $SD_H = 1.10$)

Separate Model for Assimilation

Total Model: $F(6, 414) = 6.59$, $p < .001$, $R^2 = 0.09$, $f^2 = 0.10$.

-> Degree of expectation violation: $B = .05$, $t(420) = 1.02$, $p = .31$)

-> Relevance: $B = -.03$, $t(420) = -0.69$, $p = .49$

-> Optimism: $B = .13$, $t(420) = 2.51$, $p = .01$

-> Need for Cognitive Closure: $B = .12$, $t(420) = 2.57$, $p = .01$

-> Dispositional Assimilation: $B = .17$, $t(420) = 3.59$, $p < .001$

-> Valence: $B = -.15$, $t(420) = -3.23$, $p < .001$

Personality Dispositions Model: $F(3, 417) = 8.96$, $p < .001$, $R^2 = 0.06$, $f^2 = 0.06$

Situational Characteristics Model: $F(3, 423) = 3.34$, $p = .02$, $R^2 = 0.02$, $f^2 = 0.02$

Separate Model for Accommodation

Total Model: $F(6, 423) = 3.69$, $p < .01$, $R^2 = 0.05$, $f^2 = 0.05$

-> Optimism: B = .04, t(429) = 0.75, p = .45

-> Valence: B = .00, t(429) = 0.05, p = .96

-> Relevance: B = -.01, t(429) = -0.14, p = .89

-> Degree: B = .04, t(429) = 0.76, p = .45

-> Need for Cognitive Closure: B = .15, t(429) = 3.01, p < .01

-> Dispositional accommodation: B = .16, t(429) = 3.42, p < .001

Personality Dispositions Model: $F(3, 426) = 7.22$, $p < .001$, $R^2 = 0.05$, $f^2 = 0.05$

Situational Characteristics Model: $F(3, 429) = 0.32$, $p = .81$, $R^2 = 0.00$

Separate Model for Immunization

Total Model: $F(6, 419) = 2.30$, $p = .03$, $R^2 = 0.03$, $f^2 = 0.03$

-> Need for Cognitive Closure: $B = -.06$, $t(425) = -1.12$, $p = .26$

-> Optimism: $B = .04$, $t(425) = 0.82$, $p = .41$

-> Relevance: $B = -.06$, $t(425) = -1.22$, $p = .22$)

-> Dispositional Immunization: $B = .09$, $t(425) = 1.70$, $p = .09$

-> Valence: $B = -.07$, $t(425) = -1.34$, $p = .18$

-> Degree: $B = .11$, $t(425) = 2.19$, $p = .03$

Personality Dispositions Model: $F(3, 422) = 1.84$, $p = .14$, $R^2 = 0.01$

Situational Characteristics Model: $F(3, 432) = 2.57$, $p = .05$, $R^2 = 0.02$

3. Example of an Analogy Task

Bitte beachten Sie, dass jedes Wort nur einmal verwendet werden darf.

Es macht keinen Unterschied, mit welchem Begriff Sie beginnen.

Bitte geben Sie im Folgenden die Analogien an.

Analogie 1: [Bitte auswählen] zu [Bitte auswählen] wie [Bitte auswählen] zu [Bitte auswählen]

Analogie 2: [Bitte auswählen] zu [Bitte auswählen] wie [Bitte auswählen] zu [Bitte auswählen]

Analogie 3: [Bitte auswählen] zu [Bitte auswählen] wie [Bitte auswählen] zu [Bitte auswählen]

Weiter

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Expectations do not need to be accurate to be maintained: Valence and need for cognitive closure predict expectation update vs. persistence

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Expectations about us and our environment serve to successfully anticipate the future, make accurate predictions, and guide behavior and decisions. However, when expectations are not accurate, individuals need to resolve or minimize incongruence. Coping is especially important when expectations affect important domains such as students' academic self-concept. Whether expectations are adjusted after expectation violation (accommodation), maintained by denying the discrepancy (immunization), or whether individuals modify behavior to minimize the likelihood of future expectation violations (assimilation) depends on situational and dispositional predictors. In our experiment, we examined valence of expectation violation (positive vs. negative) as a situational predictor together with need for cognitive closure (NCC) as a dispositional predictor with N=297 participants in a word riddle study. MANCOVA revealed that students tended to assimilate and accommodate more strongly after worse-than-expected achievement, and also NCC promoted both stronger accommodation and assimilation. NCC interacted with the valence of expectation violation: individuals with high NCC reported more assimilation and accommodation only after worse-than-expected achievement. The results replicate and extend previous findings: individuals do not always strive to have the most accurate expectations possible. Instead, both affective (valence) and cognitive (NCC) predictors appear to affect which coping strategy is preferred by the individual.

KEYWORDS

ViolEx model, coping, expectation, expectation violation, prediction error, need for cognitive closure, valence, achievement

Introduction

Expectations can be described as subjective probability distributions of potential situational outcomes (Panitz et al., 2021). Their future-orientation impacts present and future well-being (Rief and Glombiewski, 2017) and determines future behavior (Pinquart and Block, 2020). For instance, educational expectations characterize what individuals realistically expect to achieve (Pinquart and Ebeling, 2020) and these expectations are widely recognized as important predictors of short- and long-term outcomes such as academic achievement and educational attainment (Carolan, 2017). But being future-oriented also implies that expectations are not always accurate: expectations can be confirmed or disconfirmed by future events. Expectation violations are considered to be discrepancies between the prior expectation and the actual outcome (events, experiences, or information; Panitz et al., 2021). Individuals can cope to minimize the impact of expectation

violations either by changing/adjusting their expectations or maintaining their expectations despite disconfirming evidence.

The ViolEx (*Viol*ated *Ex*pectations) model postulates different coping strategies: cognitive mechanisms of expectation change (accommodation), cognitive mechanisms to minimize the impact of expectation violations (immunization), and active behaviors to increase the probability of expectation confirmation and decrease the probability of expectation violation (assimilation; Gollwitzer et al., 2018; Panitz et al., 2021). How individuals cope with expectation violations and which strategy is more likely and adaptive is determined by characteristics of the expectation itself as well as situational characteristics and personal dispositions (Panitz et al., 2021; Pinquart et al., 2021). Also regarding educational expectations, coping with expectation violations is likely to differ between situations with better-than-expected outcomes and worse-than-expected outcomes. Thus, the valence of expectation violation can be considered to be a significant predictor of the most likely and adaptive coping strategy. But identical situations may still result in differences in expectation update vs. expectation maintenance because of differences in personal dispositions (Panitz et al., 2021).

Personal dispositions affect and moderate cognitive mechanisms (accommodation, immunization) and active behaviors (assimilation) related to expectation update and expectation maintenance because stable dispositional differences affect the internal representation of the disconfirming situation and of the situational outcome. Furthermore, personal dispositions moderate anticipatory reactions by influencing both ability and motivation to show different behaviors aimed to minimize the impact of the experienced expectation violation. Resulting from this, characteristics of the individual affect the probability of expectation update vs. expectation maintenance in response to expectation violations (Panitz et al., 2021). Expectations can not only be quantified by their valence, but also by the uncertainty that is inherent in them (Panitz et al., 2021). Because individuals differ in their tolerance for uncertainty and ambiguity, the personal disposition need for cognitive closure may affect coping with violated educational expectations.

Based on the assumption that coping is determined by characteristics of the expectation (e.g., educational expectations), situational characteristics (e.g., valence of expectation violation) and personal dispositions (e.g., need for cognitive closure), we aim to investigate differences in coping with better-than-expected vs. worse-than-expected results in an achievement task considering individual differences in need for cognitive closure.

Characteristic of the expectation: Educational expectations

Coping with violations of educational expectations differs from other expectations, as educational expectations tend to be overly optimistic and particularly resistant to change (Carolan, 2017; Pinquart and Ebeling, 2020; Pinquart and Pietzsch, 2022). Being overly optimistic about one's abilities and future educational outcomes carries some adaptive consequences that outweigh the inaccuracy of these expectations. Holding positive expectations reduces stress, supports physical and mental health, and increases motivation for exploration and innovation (Sharot and Garrett, 2016). Yet, overly optimistic educational expectations operate in the controversy between these adaptive advantages and disadvantages due to a more frequent need to cope with worse-than-expected outcomes. Therefore, coping with educational expectation violations can be conceptualized as a value-based process to adjust the expectation to embody the highest value (Sharot et al., 2021), without necessarily being a conscious decision (Panitz et al., 2021). Educational expectations tend to be tied closely to an individual's self-concept (Suárez-Álvarez et al., 2014), which is why the highest accuracy is not always conducive to the most adaptive expectations.

Having optimistic beliefs and expectations about oneself and one's future has positive effects on the individual's self-concept (Iovu et al., 2018). If an individual receives expectation-violating information regarding their educational achievement, the advantages of the persistence of the prior expectation are–consciously or unconsciously–compared to the potential advantages of adjusting the expectation. If the advantages of the renewed expectation are perceived to be greater, individuals accommodate and change/adjust the expectation. However, if the integration of the expectation violation into the prior expectation is not seen as beneficial (e.g., because it threatens an individual's self-concept), individuals immunize against discrepant feedback, and the expectations persists and the self-image remains (Greve and Wentura, 2010) or individuals assimilate and actively change their behavior to avoid future expectation violations. Accommodation tendencies increase when expectation change does not threaten essential parts of a person's self or their worldview, whereas immunization and assimilation are adaptive to protect self-relevant concepts.

Characteristic of the situation: Valence of expectation violation

Disconfirming events can be better or worse than expected (Lebois et al., 2016). Contrary to better-than-expected events (positive valence), worse-than-expected events (negative valence) related to educational expectations can threaten individual's self-concept and individual's general preference to believe the future is bright rather than dark (Bromberg-Martin and Sharot, 2020). Thus, previous studies found a so-called optimism bias through asymmetric coping depending on the valence of the expectation violation: individuals showed stronger accommodation after better-than-expected events than after worse-than-expected events (Chowdhury et al., 2014; Garrett and Sharot, 2017; Lefebvre et al., 2017; Bromberg-Martin and Sharot, 2020). Adjusting expectations to a lower performance level would potentially be associated with more accurate judgments here, but would also result in the individual suffering from the change in expectation (Sharot et al., 2021). Therefore, individuals often assign more value to expectation persistence and–consciously or unconsciously–cope with immunization or assimilation. Asymmetry is also evident in seeking expectation-confirming information: Individuals are more likely to seek confirmation of positively valued expectations and avoid information seeking that may violate existing positive expectations or confirm negative expectations (Scherer et al., 2012). Even if expectation-violating information is very clear and trustworthy, expectations tend to remain unadjusted if change leads to undesirable outcomes (Eil and Rao, 2011; Kappes and Sharot, 2019). Instead, for affect regulation, individuals preferentially hold on to non-correct expectations associated with positive affect (Sharot and Sunstein, 2020).

The optimism bias is strongly dependent on motivational (motivation to maintain a positive and optimistic view of themselves; Sharot and Garrett, 2016) and emotional factors (feelings predict asymmetric outcomes; Charpentier et al., 2016) and already indicated

an asymmetric coping with better-than-expected versus worse-than-expected feedback about educational achievements (Eil and Rao, 2011; Sharot and Garrett, 2016). Nevertheless, there were previous findings with limited evidence for asymmetric coping, because results indicated solely stronger assimilation after experiencing negative rather than positive expectation violations (Henss and Pinquart, 2022), but no differences in accommodation or immunization. Therefore, the influence of valence on coping with expectation violations should be further explored. Individuals seem to consider how coping affects internal states and emotions. A potential threat to the academic self-concept presumably evokes aversive internal states, so negative valence should lead to a stronger tendency toward expectation-persistent strategies. Contrary, positive valence of expectation violation should lead to stronger accommodation because it presumably evokes positive internal states.

Personal disposition: Need for cognitive closure

Educational expectations are considered to be rather elaborate, certain, and stable constructs with particular significance for an individual's understanding of the world as they are central elements of the self. Humans rely on their ability to structure information about the world into expectations, schemas, and rules that are simplified models of reality. But individuals differ in their preference for simple or complex models defined as need for cognitive closure (NCC) and therefore in the way they cope with disconfirming information (Webster and Kruglanski, 1994). Higher NCC trait levels should predispose individuals to ignore and resist expectation-inconsistent information (i.e., immunization, assimilation) in order to avoid expectation-discrepant outcomes and protect their models of the world (Neuberg and Newsom, 1993; Schrackmann and Oswald, 2014). This seems to be particularly important for self-relevant characteristics, such as educational expectations. Whereas former studies showed a fairly clear set of findings in which higher NCC was associated with less accommodation or less accommodation-like tendencies (e.g., Dijksterhuis et al., 1996), more recent studies showed strongly context-dependent effects of NCC on coping (Kemmelmeier, 2015; Strojny et al., 2016; Henss and Pinquart, 2022). Higher trait levels may be associated with both stronger assimilation and stronger accommodation because both strategies may reduce uncertainty under some conditions. People are both motivated to hold accurate beliefs and to adapt to changing circumstances but also to defend previously held beliefs and expectations (Schrackmann and Oswald, 2014). Therefore, individuals may sometimes prefer disconfirming information if it is diagnostically more relevant or has a higher utility compared with expectation-confirming information (Schrackmann and Oswald, 2014). On the other hand, individuals may actively search to confirm their beliefs (assimilation) or devalue discrepant information (immunization; Schrackmann and Oswald, 2014) if expectation maintenance is more advantageous (e.g., to academic self-concept) than potentially increasing the accuracy of the expectation.

The present study

Overall, this study relies on the assumption that coping processes after expectation violations are not only related to external outcomes, but also to internal states. The respective coping with violated educational expectations does not have to be aimed at producing the most accurate expectations possible, but can also be taken in favor of one's own states and affects. Individuals evaluate the expected consequence of new information, often even unconsciously, and consider how this new knowledge will influence their psychological well-being when integrating it into their educational expectations. Resulting from this, the likelihood of each coping strategy is determined by costs (e.g., more uncertainty, acceptance of unpleasant self-relevant truths) and benefits (e.g., more accurate expectations). In addition to the situational aspect of valence of expectation violation, it should be noted that individuals have a dispositionally stable tendency as to how much they are willing to search for new information and, if necessary, to integrate it into existing concepts. These cognitive processes, as in NCC, may serve as an explanation for why individuals often do not change educational expectations despite disconfirming evidence (Kappes and Sharot, 2019). Accommodation is more likely when expectation change does not threaten people's self-concept or the essentials of their view of the world (Kahan, 2017). In Sharot and Sunstein's model (2020), it is evident that both valence with the associated affects and emotions (will the information induce positive or negative feelings, or have no influence on my affect?) and NCC with the associated cognitive processes (will information improve the ability to comprehend and anticipate my reality?) are crucial in coping with expectation violations (Sharot and Sunstein, 2020). Therefore, it seems reasonable that both predictors interact with each other in addition to their main effect on coping with expectation violations. Both predictors revealed significant but partly surprising results in a previous study (Henss and Pinquart, 2022) and will therefore be further explored in a similar study design. The following research questions were addressed: First, does a negative valence of expectation violation lead to stronger assimilation (similar to our previous study; Henss and Pinquart, 2022) as well as stronger immunization and weaker accommodation compared to positive valence of expectation violation? Second, does higher NCC predict stronger accommodation and assimilation (similar to the study by Henss and Pinquart, 2022) and stronger immunization (as found by Schrackmann and Oswald, 2014)? Third, do valence of expectation violation and NCC interact in predicting accommodation, assimilation, and immunization? Our study aims to shed light on the way in which the situational characteristic valence and the personal disposition NCC explain differences in coping after expectation violations.

Methods

The study was conducted online via SoSci Survey in a 45-min experiment. The study was approved in advance by the local ethics committee of the department of the researchers (reference number 2022-16 k). In addition, all participants confirmed written informed consent and were treated according to the ethical guidelines of the German Society of Psychology and the Declaration of Helsinki. We report how we determined our sample size, all data exclusions (if any), all manipulations, and all measures in the study.

Sample and participants

Sample size planning via G*Power resulted in a required number of participants of $n = 278$ (MANOVA: Global Effects, calculated effect size

$f^2 = 0.04$, alpha = 0.05, $\beta = 0.80$, number of groups: 2, response variables: 3), based on the effect sizes in a comparable study by Henss and Pinquart (2022). Because of expected exclusions, we stopped recruitment after $n = 297$ participants completed the questionnaire. Participants were recruited via email distribution lists from different German universities. Inclusion criteria were a minimum age of 18 years, very good German language skills, and registration at a university. To compensate for their efforts, the participants could take part in a raffle for two 50€ value vouchers.

Randomization and procedure

The study was conducted online with computer-based randomization to manipulate the valence of expectation violation as a one-factor between-subjects design. The personality variable NCC was assessed as a covariate and the coping strategies accommodation, assimilation, and immunization as dependent variables. Data collection took place from May to July 2022.

The study was advertised with a cover story as an investigation of students' linguistic abilities in word riddles. The supposed aim of the study was to determine whether the linguistic abilities of academics differ significantly from those of non-academics either at the stage of graduation or at the stage of post-graduate professional practice. The participants were told that their linguistic abilities were determined by their performance in an anagram test. Participants' demographic data and NCC were collected before participants were given an introduction to their task. To manipulate and induce an expectation violation, anagrams were used in which randomly arranged letters must be rearranged to form a word. Anagrams have been used as an effective means of violating performance expectations in a variety of previous studies (e.g., Boyes and French, 2010; Koppe and Rothermund, 2017). After introduction to the task, all participants completed an identical training task. Participants were told that they would complete a total of four runs of 11 anagrams each. In fact, only three runs were completed, but the misinformation was unavoidable to allow for a valid assessment of coping strategies after the third run.

Experimental manipulation

To manipulate the valence of expectation violation, we systematically varied between the positive versus negative valence of expectation violation at three points: test-taking information, anagram solvability, and standardized performance feedback differed between the positive and negative valence groups, similar to the successful manipulation of valence in a previous study (Henss and Pinquart, 2022).

Pre-trial information at test onset

Participants received information about the performance of previous trial test persons in accordance with their condition. In the negative valence group, in which positive expectations were to be established, participants were told that previous participants were able to solve a relatively high number of anagrams per trial (on average 9 out of 11). In the positive valence group, on the other hand, in which negative expectations were to be established first, the participants were told that a low number of anagrams could previously be solved per run (on average 4 of 11). Subsequently, participants were asked for the first time about their performance expectations for the next run.

Pre-expectation violation–Solvability of anagrams and performance feedback

The anagrams varied in difficulty between the positive valence group and the negative valence group in order to stabilize participants' expectation. In the positive valence group, where low expectations were initially to be generated, participants were given four easily solvable and seven unsolvable anagrams so that the negative performance feedback ("You could not solve more than 4 of the 11 anagrams correctly") was valid. In the negative valence group, where high expectations were to be generated, participants received 11 easily solvable anagrams and feedback that they had performed above average ("you were able to solve at least 9 of the 11 anagrams correctly"). The second run was structured identically. Participants were given new anagrams, but they met the criteria of the first run. Performance feedback was also identical to the previous run.

Expectation violation

According to the assignment to the positive or negative valence group, an expectation violation was induced in the third and last run. In the positive valence group, after building up low expectations, participants now received 11 easily solvable anagrams and feedback that their performance exceeded their expectations. In the negative valence group, after building high expectations, participants now received four easily solvable anagrams and seven unsolvable anagrams, along with feedback that their performance was below their expectations. Finally, the subjects' coping strategies were assessed, with the cover story that we wanted to elicit reasons for the discrepancy with the previous runs. Subsequently, the study ended and participants were informed of the true intention of the study.

Measures

Socio-demographics

At the beginning of the study, we assessed age, gender, and field of study, as well as current semester of study and type of study (bachelor vs. master). The information was collected to increase the credibility of the cover story on the relationship between test performance and level of academic education.

Manipulation check

To check for the generation of positive and negative expectations, we assessed how many anagrams participants expected to solve before each run. This allowed us to check if participants actually experienced an expectation violation. Participants could state performance expectations between 0 and 11 anagrams per run.

Need for cognitive closure

The personality trait NCC was assessed prior to the start of the test runs using Schlink and Walther's (2007) 16NCCS (Need for Cognitive Closure Scale). The scale consists of 16 items that were answered on a 7-point scale ranging from 1 = strongly disagree to 7 = strongly agree. Cronbachs alpha indicated good internal consistency with $\alpha = 0.84$.

Coping strategies

To capture coping strategies, we relied on scales previously used in a similar study (Henss and Pinquart, 2022). This scale was revised and adapted to the anagram paradigm. The revision was mainly related to the immunization subscale in order to increase its internal consistency

by focusing more on the subfacets denial and devaluation. The final scale consisted of 22 items and a 7-point Likert scale ranging from 1 = strongly disagree to 7 = strongly agree. Accommodation was assessed with 6 items (e.g., "In the future, I will try to be more realistic about my performance.") and had good internal consistency with $\alpha = 0.86$. Assimilation was assessed with 7 items (e.g., "I will pay more attention in the next test block to make sure that my previous expectation comes true.") and had acceptable internal consistency with $\alpha = 0.75$. Immunization was assessed with nine items (e.g., "The performance in the last run was atypical for me.") and had acceptable internal consistency with $\alpha = 0.74$.

Data analysis

To calculate main statistical effects of the manipulated variable valence and the personality trait NCC, as well as their interaction with respect to the three coping strategies, a MANCOVA was performed for the overall model with valence as an independent variable and NCC as covariate as well as their interaction. The MANCOVA was calculated at a significance level of 5%.

Transparency and openness

We report how we determined our sample size, all data exclusions, all manipulations, and all measures in the study. All data and research materials are available at Open Science Framework (DOI 10.17605/OSF.IO/EBUJM). Data were analyzed using IBM SPSS Statistics 29. Our study design and its analysis were not pre-registered.

Results

Participants

We checked data of all $n = 297$ participants for univariate outliers via Box-Whisker plots and for multivariate outliers via Mahalanobis Distance ($p < 0.001$). Whereas univariate outliers were checked for plausibility and if necessary, only excluded pairwise, we excluded three data sets from further analysis because they were identified as multivariate outliers. Furthermore, 26 data sets of participants were excluded because the participants had either detected the experimental manipulation or had not experienced an expectation violation. The former was indicated qualitatively by a free response field at the end of the study, where participants could indicate what they thought the background of the study was. Here, exclusion occurred when subjects indicated that the study goal was to analyze coping with expectation violations and additionally indicated that they did not find the manipulation credible (e.g., „I assume that the feedback was not related to my actual performance, but to investigate coping with violated expectations"). The second was indicated quantitatively by specifying that participants in the negative valence group had the expectation of solving at least six anagrams and that participants in the positive valence group had the expectation of solving a maximum of six anagrams.

The final sample consisted of $n = 268$ participants. The participants were mainly young adults ($M = 23.87$, $SD = 4.98$), female ($n_{female} = 215$, $n_{male} = 73$, $n_{diverse} = 9$), bachelor students ($n_{bachelor} = 204$, $n_{master} = 93$) in the fields of psychology ($n = 108$), social sciences ($n = 83$), natural sciences ($n = 63$), teaching ($n = 22$) or others ($n = 25$).

Manipulation check

To verify that expectations differed between groups, we compared the reported expectations before the manipulation of the valence of expectation violation. There should be significantly lower expectations in the positive valence group compared with the negative valence group. Independent t-tests revealed that participants' expectations differed significantly between the groups ($t_1(266) = -10.54$, $p < 0.001$; $t_2(215) = -25.14$, $p < 0.001$; $t_3(266) = -35.14$, $p < 0.001$) and that the difference between the groups increased with each run ($M_{1p} = 5.31$, $SD_{1p} = 1.79$ vs. $M_{1n} = 7.66$, $SD_{1n} = 1.86$; $M_{2p} = 3.72$, $SD_{2p} = 1.14$ vs. $M_{2n} = 8.34$, $SD_{2n} = 1.78$; $M_{3p} = 3.30$, $SD_{3p} = 1.25$ vs. $M_{3n} = 8.88$, $SD_{3n} = 1.35$). It can be concluded that the manipulation of the valence of expectation violation was successful, and significantly lower expectations were induced in the positive valence group compared with the negative valence group. Expectations solidified over time and, on average, corresponded in the run before the expectation violation to the expectation values that participants received in advance as information about prior performance.

MANCOVA

To evaluate both the main effects of NCC and valence of expectation violation and their interaction effect regarding the dependent variables accommodation, assimilation, and immunization, we conducted a MANCOVA. The main effects analysis showed statistical significance for both valence and NCC. Valence of expectation violation was a significant predictor in the overall model (Wilk's $\Lambda = 0.96$, $F(3, 262) = 3.26$, $p = 0.02$, $\eta_p^2 = 0.03$) and revealed a significant effect on accommodation ($F(1, 264) = 9.66$, $p < 0.01$, $\eta_p^2 = 0.04$) and assimilation ($F(1, 264) = 4.19$, $p = 0.04$, $\eta_p^2 = 0.02$). Positive valence of expectation violation was associated with less accommodation ($M_p = 4.09$, $SD_p = 1.09$ vs. $M_n = 4.24$, $SD_n = 1.10$), and negative valence with stronger assimilation ($M_p = 3.95$, $SD_p = 0.93$ vs. $M_n = 4.23$, $SD_n = 0.88$). However, there was no significant effect of valence of expectation violation on immunization ($F(1, 264) = 0.10$, $p = 0.77$; $M_p = 4.28$, $SD_p = 0.94$ vs. $M_n = 4.69$, $SD_n = 0.84$). The covariate NCC was also a significant predictor in the overall model (Wilk's $\Lambda = 0.97$, $F(3,262) = 2.99$, $p = 0.03$, $\eta_p^2 = 0.03$). Here, statistically significant effects were found on accommodation ($F(1, 264) = 6.99$, $p < 0.01$, $\eta_p^2 = 0.03$) and assimilation ($F(1) = 6.37$, $p = 0.01$, $\eta_p^2 = 0.02$), but not on immunization ($F(1, 264) = 0.07$, $p = 0.79$, $\eta_p^2 = 0.00$). Individuals with higher NCC reported stronger accommodation *and* assimilation. As well, the interaction of the two independent variables valence and NCC was significant ($F(3, 262) = 4.50$, $p < 0.01$, $\eta_p^2 = 0.05$) and showed a statistical effect on accommodation ($F(1, 264) = 11.76$, $p < 0.01$, $\eta_p^2 = 0.04$) and assimilation ($F(1, 264) = 6.85$, $p < 0.01$, $\eta_p^2 = 0.03$), but again not on immunization ($F(1, 264) = 0.17$, $p = 0.68$, $\eta_p^2 = 0.00$). Whereas higher NCC was associated with slightly less accommodation in the positive valence group, the opposite was true in the negative valence group: the higher a participant's NCC, the more accommodation was reported (see Figure 1).

With regard to assimilation, the same pattern emerged: in the positive valence group, participants with higher NCC reported slightly less assimilation, whereas in the negative valence group, with increasing NCC, more assimilation was reported (see Figure 2). Overall, analysis of the total MANCOVA model revealed medium effect sizes for accommodation (Wilk's $\Lambda = 0.95$, $F(3, 264) = 5.84$, $p = 0.001$, $\eta_p^2 = 0.06$) and assimilation ($F(3, 264) = 4.76$, $p = 0.001$, $\eta_p^2 = 0.06$) and small effect

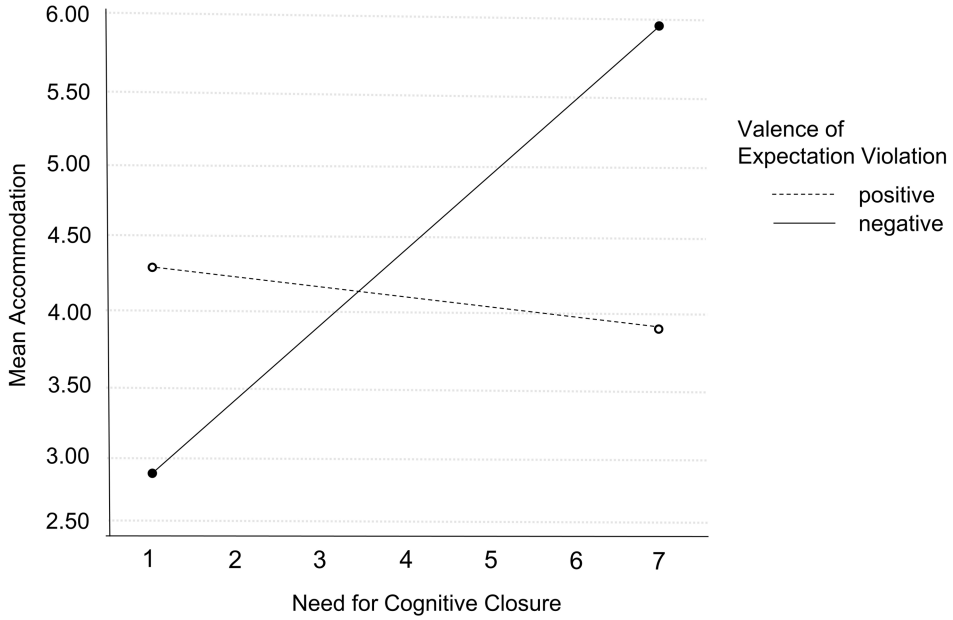

FIGURE 1
Interaction effect of valence of expectation violation and NCC on accommodation. All variables were measured on a 7-point Likert scale.

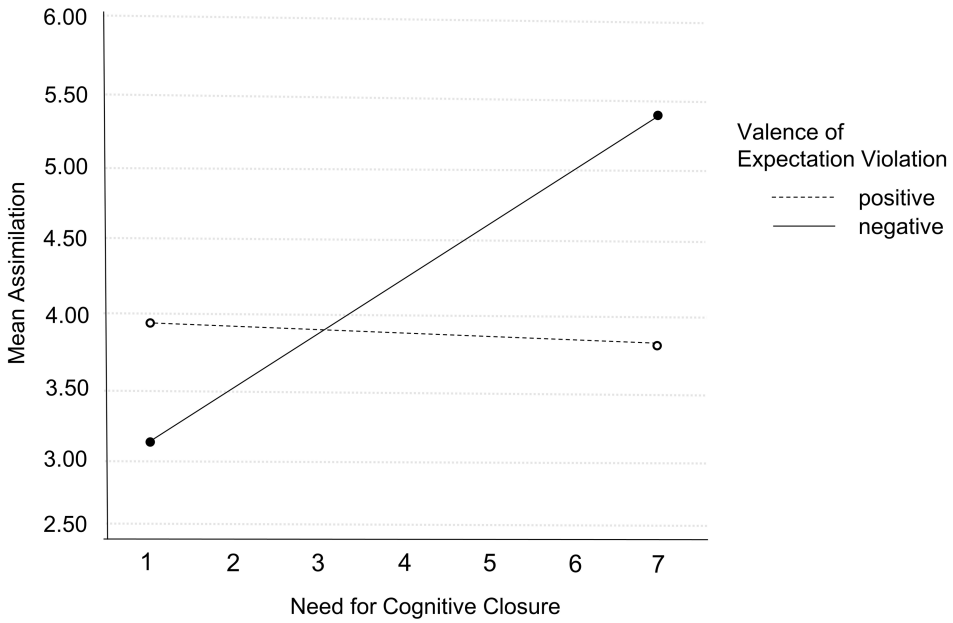

FIGURE 2
Interaction effect of valence of expectation violation and NCC on assimilation. All variables were measured on a 7-point Likert scale.

size for immunization ($F(3, 264) = 4.67$, $p < 0.01$, $\eta_p^2 = 0.05$) according to Cohen's taxonomy (Cohen, 1988).

Discussion

The aim of the study was to investigate both situational characteristics in the form of valence of expectation violation and personal dispositions with NCC as predictors of coping with expectation violation in the context of educational expectations. Based on the ViolEx model, our aim was to investigate how both predictors affect cognitive and behavioral coping strategies after expectation violations. In accordance with Sharot and Sunstein's model (2020), affective and emotional aspects determined by valence as well as cognitive mechanisms determined by NCC were included (Sharot and Sunstein, 2020). We identified valence and NCC as significant predictors of coping with expectation violations and obtained comparable, partly surprising results similar to those of the previous study (Henss and Pinquart, 2022).

Whereas positive valence led to less accommodation, negative valence led to more assimilation. Stronger NCC again led to both more assimilation and accommodation, but was not related to immunization. The interaction of both predictors showed that the effect of NCC on coping strategies was valence-dependent: the significant effect on assimilation and accommodation was evident only after negative valence of expectation violation.

Characteristic of the situation: Valence

Educational expectations tend to be overly optimistic and do not necessarily need to be accurate to be adaptive (Garrett et al., 2018). Expectation violations might be costly in certain situations, but advantageous in others when their benefits outweigh their costs (McKay and Dennett, 2009). This cost–benefit trade-off should be particularly important when considering the valence of the expectation violation and should lead to differences in coping: former studies indicated an optimism bias, because individuals integrated information into expectations asymmetrically based on the valence and therefore desirability of the information. We suspected that especially for self-relevant beliefs like educational expectations, individuals protect their academic self-concept through coping related to expectation maintenance after negative valence of expectation violation (Greve and Wentura, 2010) and positively adjust their academic self-concept through expectation update after positive valence.

Our first finding was not in line with an optimism bias: individuals reported less accommodation after an expectation violation with positive valence. This could possibly be related to the measurement of accommodation, which states, among others, that the respondent will try to form more realistic expectations in the future. However, individuals might have been encouraged by the positive feedback to be more optimistic, which would also be consistent with the theoretical approach of overly optimistic educational expectations.

Nevertheless, our second finding was in line with asymmetric coping after expectation violation and the result of our former study: individuals reported more assimilation after an expectation violation with negative valence. Thus, when individuals are confronted with a reality in which their positive achievement expectations are not met, they report active behavioral tendencies aimed at fulfilling their future expectations despite worse-than-expected present feedback. Increasing effort to compensate for a worse-than-expected performance can be considered as adaptive and in line with theoretical assumptions of self-concept protection and stability of educational expectations. Expectation update is more likely for uncertain expectations and less likely for certain and elaborated expectations such as educational expectations in university (Spicer et al., 2020).

It is nevertheless surprising that, after worse-than-expected feedback, individuals reported stronger assimilation, but not stronger immunization, which is also considered to be an expectation-maintaining strategy for self-concept protection (Greve and Wentura, 2010). The lack of significance could have both theoretical and methodological reasons: First, the dependence of the effect of negative valence on immunization on a high degree of expectation violation found in a previous study could explain the absence of the effect in this study (Henss and Pinquart, 2022). If the feedback in our study was not perceived as "expectation-violating enough" because we did not include information about a high degree of expectation violation, participants probably had no incentive to immunize. Performance feedback could be adjusted by clearly indicating that performance was strongly above or below expectations. Second, it should be noted that immunization as an unconscious and non-intentional process is difficult to capture by an explicit self-report measure. Recent literature suggests that immunization as an automatic process might be adequately assessed via indirect measures (Rief et al., 2022) or that the different facets of immunization might be captured via open questions and qualitative analysis (Kube et al., 2022).

Personal disposition: Need for cognitive closure

Previous studies have suggested that the effects of NCC on coping are context-dependent and may promote both expectation update and expectation maintenance. Our results support this assumption and are perfectly in line with Sharot and Sunstein's thoughts (2020): information can enhance or reduce individual's view to comprehend their environment and disconfirming information challenges people's existing models and schemata (Sharot and Sunstein, 2020). In the present study, simply ignoring the discrepancy between expected and actual achievement would not be the best way of coping for individuals with high NCC as they believed to participate in a fourth run immediately thereafter which could provide additional expectation violations. Therefore, immunization did not differ between individuals with higher vs. lower NCC. Individuals strive to make accurate predictions and therefore integrated performance feedback through expectation change or behavior adjustment to ensure that expectations are less likely to be violated in the future. Thus, adjustment of expectation in the direction of the formerly unexpected feedback (accommodation) or active behavior of creating a reality that conforms to prior expectations (assimilation) are more likely to fulfill their need for clarity and structure, and to the avoidance of uncertainty compared with denial or devaluation (immunization).

Accommodation is related to the improvement of existing expectations, schemata and models with new information to improve the fit between expectation and reality (Sharot and Sunstein, 2020). Stronger accommodation after disconfirming information leads to more comprehension of the world and, therefore, fulfills the needs of an individual with high NCC.

Assimilation is related to the active avoidance of information that is suspected to weaken the understanding of the world. Stronger assimilation after disconfirming information promotes a fit between the internal representation of the expectation and reality by actively changing the reality of which individuals are aware (Sharot and Sunstein, 2020).

Interestingly, in our study, accommodation and assimilation are not mutually exclusive, but positively correlated with each other (see also Henss and Pinquart, 2022). According to the ViolEx model, it is assumed that expectation violations may lead to accommodation (which can be both expectation update but also "only" expectation destabilization), which can in turn motivate stronger assimilation to restore confidence. Moreover, the combination of modest expectation adjustment and efforts to meet expectations may potentially be an adaptive approach to minimize the magnitude of future expectation violations. Individuals might accept a new reality, but nevertheless strive to meet the prior expectation. This conclusion seems especially plausible when considering the interaction of both predictors in the following paragraph.

Valence and NCC

As effects of NCC seem to be context-dependent and may be determined by the assigned value or advantage of beliefs, effects of NCC likely depend on the valence of expectation violation (i.e., will accepting a new reality be advantageous or will maintaining existing schemata despite less accuracy be advantageous?). The evaluation of information is a non-intentional, unconscious cognitive process and strongly sensitive to motivational influences like valence of the expectation violation (Schrackmann and Oswald, 2014). Indeed, there were differences between positive and negative valence: stronger accommodation and assimilation of individuals with high NCC were only found after experiencing a negative valence of expectation violation. No difference was found for positive valence, and this pattern was shown for both accommodation and assimilation. NCC seems to depend on valence, and the trait NCC seems to be particularly important for coping with expectation violations when individuals experience a worse-than-expected reality. Possibly, a negative violation of expectations causes a stronger need for regulation due to stress, which in turn could lead to a stronger impact of personality dispositions like NCC on behavior.

Limitations and conclusions

As in previous studies on the ViolEx model, the internal consistencies of some scales on coping with expectation violations were less than optimal in this study. The ViolEx model is still a very new theoretical model that has only been empirically researched in recent years, and experimental research in particular is still in its infancy. Therefore, there is still a need for optimization with regard to the measurement of coping processes. But it should be noted that independently of the ViolEx model, the measurement of immunization has so far proven to be very difficult (Brandtstädter, 2007).

It should also be noted that the study was conducted with feedback on achievement expectations which are strongly shaped by prior experiences and expectations (Andrew and Hauser, 2011; Carolan, 2017). Therefore, the generated expectation must always be considered in the context of generalized expectations and other cognitions. A certain and elaborated expectation that has often been confirmed in the past would less likely change as a result of a single expectation violation than an expectation that is associated with less prior experience or has been disconfirmed more frequently. For future studies, it might be beneficial to integrate general educational expectations independent from the achievement task itself, because coping might be biased by previous experiences and expectations. Furthermore, this information can be used to differentiate between individuals who base their self-esteem more strongly on achievement expectations than others in order to investigate if immunization processes are more strongly reported in individuals with a potentially higher threat to their academic self-concept (Greve and Wentura, 2003).

In our study, we replicated and expanded our former results that coping with expectation violation in an achievement context is predicted by situational characteristics and personal dispositions. The context-dependent effects of NCC are partly based on valence, because higher NCC seems to be of high relevance when facing a worse-than-expected reality, but not when facing a better-than-expected reality. Higher NCC again resulted in stronger accommodation and assimilation, indicating that both coping strategies seem to be not mutually exclusive coping strategies in this context, although they seem to be contradictory by definition. Finally, our results indicate that expectations do not always need to be accurate to be adaptive — individuals are sometimes reluctant to update their expectations because it would evoke negative feelings and therefore even actively adjust their behavior to confirm and protect prior expectations. Provided that events can be influenced and controlled to some extent, active behavioral change through assimilation is the most adaptive strategy to respond to events with negative valence. Assimilation can reduce the likelihood of future disappointment and negative affect and furthermore avoids the negative feelings associated with lowering expectations through accommodation.

Data availability statement

The datasets presented in this study can be found in online repositories. The names of the repository/repositories and accession number(s) can be found at: https://osf.io/ebujm/ (DOI 10.17605/OSF.IO/EBUJM).

Ethics statement

The studies involving human participants were reviewed and approved by Philipps University Marburg, Ethics Committee in Psychology (FB04). The patients/participants provided their written informed consent to participate in this study.

Author contributions

LH was the main contributor to the conception and design of the study, and organized the database and performed the statistical analysis. LH wrote the manuscript and MP added his ideas and corrections several times. LH and MP contributed to manuscript revision, read, and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

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Anhang A – Verwendete Skalen

Subskala Akkommodation

Für den kommenden Testblock werde ich meine Erwartung an die erhaltene Rückmeldung anpassen. (For the upcoming test block, I will adjust my expectation based on the feedback I received.)

In Zukunft werde ich versuchen, meine Leistung realistischer einzuschätzen. (In the future, I will try to be more realistic about my performance.)

Ich werde meine Leistungseinschätzungen verbessern. (I will improve my performance assessments.)

Ich werde meine Leistungserwartungen an mich selbst überdenken. (I will reconsider my performance expectations of myself.)

Für den nächsten Testblock passe ich meine Erwartung an meine tatsächliche Leistung an. (For the next block of tests, I will adjust my expectation to match my actual performance.)

Ich beabsichtige, den Unterschied zwischen meiner Erwartung und meiner tatsächlichen Leistung zu reduzieren. (I intend to reduce the difference between my expectation and my actual performance.)

Subskala Assimilation

Die Schwierigkeit der Anagramme sollte entsprechend der eigenen Erwartungen gewählt werden können. (I wish to be able to choose the difficulty of the anagrams according to my own expectations.)

Ich werde im nächsten Testblock mehr darauf achten, dass meine vorherige Erwartung in Erfüllung geht. (I will pay more attention to meeting my previous expectation in the next test block.)

Ich werde im nächsten Testblock meine Anstrengungen an meine Erwartungen angleichen. (I will align my effort with my expectations in the next test block.)

Im nächsten Testblock werde ich mich so konzentrieren, dass meine Leistung meinen Erwartungen entspricht. (In the next test block, I will focus so that my performance meets my expectations.)

Ich beabsichtige, meine Bemühungen mit meinen Erwartungen in Übereinstimmung zu bringen. (I intend to bring my efforts in line with my expectations.)

Auch wenn mir im nächsten Testblock Anagramme leichter oder schwerer fallen sollten, werde ich bemüht sein, meine Erwartungen zu erfüllen. (Even if anagrams become easier or harder for me in the next test block, I will make an effort to meet my expectations.)

Im nächsten Testblock hätte ich gern Aufgaben, die besser zu meiner Leistungserwartung passen. (In the next test block, I would like to have tasks that better match my performance expectations.)

Subskala Immunisierung

Das Ergebnis im letzten Durchgang war eine Ausnahme. (The result in the last block was an exception.)

Das Ergebnis spiegelt nicht mein tatsächliches Leistungsvermögen wider. (The result does not reflect my actual performance.)

Das Testergebnis ist mir unwichtig. (The test result is not important to me.)

Ich glaube nicht, dass man mit diesem Test wirklich die sprachlichen Fähigkeiten gut vorhersagen kann. (I don't think this test is really a good predictor of language ability.)

Die Leistung im letzten Durchgang war untypisch für mich. (The performance in the last block was atypical for me.)

Das Ergebnis sagt nichts über meine tatsächlichen sprachlichen Fähigkeiten aus. (The score says nothing about my actual linguistic ability.)

Ich bezweifle, dass ich dem Ergebnis des letzten Durchgangs trauen kann. (I doubt that I can trust the result of the last block.)

Das Ergebnis beschäftigt mich nicht weiter. (The result does not concern me further.)

Das Testergebnis aus dem letzten Durchgang ist zu vernachlässigen. (The test result from the last block is negligible.)

Anhang B - Anagrammaufgabe

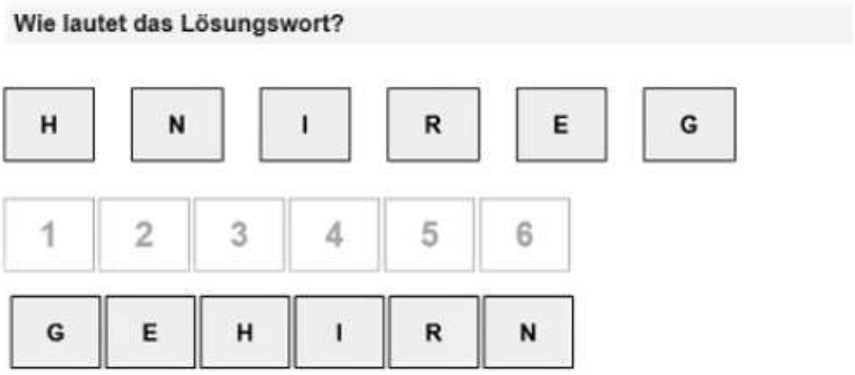
Instruktionen

Nun ist es Zeit für die Bearbeitung der Wörterrätsel!

Zur Erfassung Ihrer sprachlichen Fähigkeiten werden sogenannte **Schüttel-Anagramme** verwendet. Anagramme sind Wörterrätsel, bei denen durch das Umstellen von Buchstabenfolgen Wörter gebildet werden sollen.

Sie werden im Folgenden insgesamt **4 Durchgänge** absolvieren, in denen Ihnen **jeweils 11 Anagramme** präsentiert werden. Jedes Anagramm wird auf einer neuen Seite angezeigt. Durch das Klicken auf Weiter gelangen Sie zum nächsten Rätsel. Beachten Sie, dass Sie NICHT die Möglichkeit haben zu einer vorherigen Aufgabe zurückzukehren, wenn Sie einmal auf *Weiter* geklickt haben!

Zum Lösen der Anagramme müssen Sie die Buchstaben durch Ziehen in die richtige Reihenfolge bringen, sodass ein sinnvolles Wort entsteht. Es müssen alle Buchstaben verwendet werden. Hier ein kleines Beispiel:



Versuchen Sie **so viele** Anagramme wie möglich, **so schnell wie möglich** zu lösen!

Das Schwierigkeitslevel wurde bei allen Anagrammen ähnlich gestaltet. Manchen Personen kann das Lösen der Rätsel aber dennoch leichter fallen und weniger knifflig vorkommen als anderen. Deshalb ist es auch kein Problem, wenn Sie nicht alle Anagramme lösen können. Falls Ihnen die Lösung für ein Rätsel nicht einfallen sollte und Sie es aufgrund der voranschreitenden Zeit überspringen wollen, klicken Sie ohne Eingabe auf *Weiter*.

Damit Sie mit der Aufgabe vertraut werden, haben Sie auf der nächsten Seite die Möglichkeit eine Übungsaufgabe durchzuführen.

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Coping with Expectation Violations in Education: The Role of Optimism Bias and Need for Cognitive Closure

--Manuscript Draft--

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Abstract:	Although nearly all individuals experience expectation violations in their educational years, individuals' coping strategies differ depending on situational and dispositional characteristics with potentially decisive influence on educational success. As a situational characteristic, optimism bias indicates that individuals tend to update their expectations after better-than-expected feedback and to maintain their expectations after worse-than-expected feedback. As a dispositional characteristic, higher need for cognitive closure (NCC) indicates that individuals tend to both update (accommodation) and try to confirm expectations (assimilation) after worse-than-expected feedback. To better understand mechanisms behind optimism bias and context-dependent effects of NCC in an educational context, we included controllability and self-enhancement in an experimental case vignettes study. Our sample of N = 249 students was divided into four experimental groups (high/low controllability x positive/negative valence) and read four different case vignettes referring to expectation violations in an educational context. MANCOVA revealed that individuals update their expectations after better-than-expected feedback when they have a stronger tendency to self-enhance, and that individuals maintain their expectations after worse-than-expected feedback mainly in controllable situations. Furthermore, interindividual differences in NCC interacted with controllability in predicting expectation update. We conclude that considering the influences of controllability and self-enhancement, we can better understand and evaluate the adaptivity of the optimism bias and context-dependent effects of NCC in an educational context.

Coping with Expectation Violations in Education: The Role of Optimism Bias and Need for Cognitive Closure

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Although nearly all individuals experience expectation violations in their educational years, individuals' coping strategies differ depending on situational and dispositional characteristics with potentially decisive influence on educational success. As a situational characteristic, optimism bias indicates that individuals tend to update their expectations after better-than-expected feedback and to maintain their expectations after worse-than-expected feedback. As a dispositional characteristic, higher need for cognitive closure (NCC) indicates that individuals tend to both update (accommodation) and try to confirm expectations (assimilation) after worse-than-expected feedback. To better understand mechanisms behind optimism bias and context-dependent effects of NCC in an educational context, we included controllability and self-enhancement in an experimental case vignettes study. Our sample of *N* = 249 students was divided into four experimental groups (high/low controllability x positive/negative valence) and read four different case vignettes referring to expectation violations in an educational context. MANCOVA revealed that individuals update their expectations after better-than-expected feedback when they have a stronger tendency to self-enhance, and that individuals maintain their expectations after worse-than-expected feedback mainly in controllable situations. Furthermore, interindividual differences in NCC interacted with controllability in predicting expectation update. We conclude that considering the influences of controllability and self-enhancement, we can better understand and evaluate the adaptivity of the optimism bias and context-dependent effects of NCC in an educational context.

Keywords: educational expectations, expectation violation, optimism bias, ViolEx model, need for cognitive closure, controllability

Throughout our school and college education, most of us experience successes and failures. Some of them do not surprise us, but others do. Whereas unexpected positive feedback is perceived as particularly satisfying, unexpected negative feedback is perceived as particularly aversive (Shanahan et al., 2020). In addition to situational influences such as valence of expectation violation, there are also interindividual differences in coping with disconfirming feedback. For individuals with higher need for cognitive closure (NCC), expectation violations are generally unpleasant, because they are less able to tolerate the inherent uncertainty (Webster & Kruglanski, 1994; Roets & van Hiel, 2011). But how adaptively individuals cope with expectation violations can be decisive for the success of their academic careers. After receiving disconfirming negative feedback, individuals are more likely to maintain expectations while they are more likely to update expectations after receiving disconfirming positive feedback (Garrett & Sharot, 2017; Lefebvre et al., 2017; Kube & Glombiewski, 2021). This asymmetry in coping with disconfirming information has been referred to as the optimism bias (Sharot, 2011). Whereas some studies did find an optimism bias in coping, these results were only partly replicated in the educational context: here, individuals reported expectation maintenance after worse-than-expected feedback, but did not show expectation update after better-than-expected feedback (own citation, 2022; own citation, 2023). In addition, the impact of NCC was found to be valence-dependent: higher NCC led to stronger assimilation (active behavior to promote expectation confirmation) and accommodation (expectation change) only after receiving negative feedback (own citation, 2023). The identification of additional predictors can enhance our understanding of valence-dependent coping with violated educational expectations and furthermore help us to evaluate the adaptiveness of the respective coping strategy. Therefore, we aim to include the predictors controllability and self-enhancement to shed light on mechanisms behind the optimism bias and the valence-dependent effect of NCC on coping.

Expectations and the Academic Self-Concept

Individuals constantly form expectations about themselves and their environment. Expectations are important and useful cognitions because they influence future behavior (own citation, 2020). In academics, educational expectations are important predictors of a whole range of short- and long-term outcomes such as effort (Schoon & Ng-Knight, 2017) and academic

attainment (Carolan, 2017). Educational expectations are closely tied to an individual's academic self-concept (ASC), which is the mental representation of one's academic abilities in general and in different academic domains (Arens et al., 2021). Higher ASC leads to desirable outcomes such as higher educational aspirations and expectations, better attainment, and more favorable learning behavior (Schnitzler et al., 2020; Wu et al., 2021). But as future-oriented cognitions, educational expectations can be inaccurate. The ViolEx model (Gollwitzer et al., 2018; Panitz et al., 2021) defines expectations as conditional predictions about future events that are maintained or updated in the face of disconfirming evidence. To cope with disconfirming evidence, individuals can anticipate expectation violations and increase the probability of expectation confirmation through active behavior (assimilation) or they can deny or devalue disconfirming evidence (immunization). Both assimilation and immunization result in the maintenance of prior expectations. Contrary, individuals can update their expectations in line with disconfirming evidence (accommodation) resulting in actual change or adaptation of expectations.

Need for Cognitive Closure

Because expectations have a predictive function, expectation violations can induce uncertainty and thus unpleasant cognitive dissonance. The extent to which an expectation violation is perceived as unpleasant depends, among other things, on how strongly individuals are dispositionally motivated to avoid uncertainty. Need for cognitive closure (NCC) is defined as the preference for clarity as opposed to ambiguity and uncertainty (Webster & Kruglanski, 1994). Recent research demonstrated that the effects of NCC on coping are highly context-dependent (Kemmelmeier, 2015; Strojny et al., 2016). Individuals with higher NCC were found to report stronger accommodation, but also stronger assimilation. With higher NCC, individuals seemed more likely to both accept a new reality (accommodation), but nevertheless also adjust their behavior to confirm prior expectations (assimilation; own citation, 2022; own citation, 2023). But students with higher NCC showed stronger assimilation and accommodation only when feedback was worse-than-expected. When feedback is worse-than expected, individuals are more likely to maintain expectations despite disconfirming negative feedback (Kube et al., 2019), whereas they are more likely to update expectations after receiving better-than-expected feedback (Garrett & Sharot, 2017).

Coping with Worse-than-Expected Feedback

Adaptive coping with worse-than-expected achievement feedback is crucial to avoid threats to the ASC. Individuals tend to show stronger expectation-maintaining strategies after receiving worse-than-expected feedback, but whether assimilation and immunization have a positive long-term effect on ASC depends on whether they increase or decrease the likelihood of future expectation violations. How likely expectation violations are in the future also depends, among other things, on how much the individual is able to control the experienced expectation violation (own citation, 2021). Perceived controllability in the educational context refers to students' belief in their influence over academic success or failure (Respondek et al., 2017). Higher perceived controllability is linked to several adaptive educational outcomes such as higher academic success and lower risk for dropout of university (Respondek et al., 2017). With higher perceived controllability, the optimistic bias is particularly pronounced (Jansen, 2016) and academic-related optimism bias can be beneficial for achievement and performance if accompanied by a sense of control (Ruthig et al., 2007). Therefore, controllability and valence are likely to be related in explaining adaptive and maladaptive coping with violated educational expectations.

Additionally, individuals with higher NCC tend to prefer clear and unambiguous situations, which is why uncontrollable situations, similar to negative feedback, pose a particular threat to their ASC. Therefore, individuals with lower NCC disengage from uncontrollable tasks, whereas individuals with higher NCC continue to invest effort in uncontrollable tasks to reduce uncertainty (i.e., assimilation; Szwed et al., 2021). Thus, controllability of the situation might also enhance our understanding of why individuals with a higher NCC differ from individuals with a lower NCC with respect to optimism bias. With a higher NCC and worse-than-expected feedback, individuals reported both accommodation and assimilation (own citation, 2023), contrary to the assumption that negative valence should result in less accommodation. Using both strategies simultaneously might be particularly adaptive to avoid future expectation violations, as behavior is adjusted to fulfill existing expectations but also expectation adjustment takes place to avoid disappointment.

Coping with Better-than-Expected Feedback

Unlike worse-than-expected feedback, positive valence poses no threat to the ASC. Nevertheless, individuals differ in how adaptively they cope with positive feedback, which can be

beneficial or detrimental to their academic careers. Optimism bias indicates that individuals accommodate more strongly after receiving better-than-expected feedback, but recent research has failed to confirm this expectation update in the educational context (own citation, 2022; own citation, 2023). Individuals incorporate even positive feedback to varying extents into their ASC and their educational expectations. In order to accommodate, a positive violation of expectations must be integrated into the ASC to self-enhance with regard to one's own academic performance. A strategy for self-enhancement is to use favorable construals which are self-serving cognitions about the world (e.g., interpreting ambiguous feedback as positive). Favorable construals are not bound to specific situations, but are particularly triggered by receiving various feedback (Hepper et al., 2013). Furthermore, how individuals use favorable construals interacts with the valence of feedback: positive feedback is lower in threat potential compared with negative feedback and therefore more likely to be processed extensively (Green et al., 2005; Hepper et al., 2013; Zingoni & Byron, 2017). More extensive processing of positive feedback to self-enhance may be a necessary condition for optimism bias and stronger accommodation after positive violations of educational expectations .

The Present Study

Expectation violations can refer to a variety of situations in the educational context. We selected some of these situations and presented them to students in case vignettes. In doing so, we expected both dispositional characteristics (NCC) and situational factors (valence, controllability) and their interplay to affect how students cope with expectation violations.

We hypothesized the following main effects: first, students with higher NCC report stronger accommodation and assimilation. Second, we expected a confirmation of the optimism bias with students reporting stronger assimilation after worse-than-expected feedback as compared to better-than-expected feedback. Third, when the expectation-violating situation is not controllable, students were expected to report more immunization than in controllable situations.

However, the main goal of the study was to better understand the mechanisms behind optimism bias and coping in individuals with high NCC. Thus, we were particularly interested in how valence and NCC interact with controllability and self-enhancement. We hypothesized that the combination of negative valence and low controllability of the expectation violation leads to

stronger immunization, whereas the combination of negative valence and high controllability leads to stronger accommodation and assimilation. Practically, this means that if an exam grade is worse than expected and students had no control over it (e.g., due to incomprehensible evaluation criteria), they are more likely to consider this expectation violation as an exception and to immunize. However, if they had control over their worse performance (e.g., due to inadequate preparation), they are more likely to change their behavior in response to the expectation violation.

After expectation violation with positive valence, on the other hand, we hypothesizes that a stronger accommodation is found only when individuals use feedback for self-enhancement. In practical terms, this means that an unexpectedly good exam only leads to higher expectations about the future if individuals show a stronger tendency for self-enhancement.

For NCC, we aim to explore how the controllability of the situation influences coping with expectation violations, because uncontrollable situations should be perceived as more aversive for individuals with high NCC than for individuals with lower NCC. Therefore, we assumed an interaction between NCC and controllability on coping.

Methods

The study was approved by the local ethics committee of anonymous for review (reference number 2022-68k). All participants confirmed written informed consent and were treated according to the ethical guidelines of the German Psychological Society and the Declaration of Helsinki. In addition, the study was preregistered in the Open Science Framework (doi.org/10.17605/OSF.IO/6A8G9) and supplementary material can be found online (osf.io/2xkms/).

Participants

To estimate the required number of participants, an a priori sample size analysis was conducted using G*Power. Power analysis was performed for both main effects (MANOVA: $f^2 = .03$; $\alpha = .05$; $ß = .90$; 4 groups, 3 outcomes) and interaction effects (MANOVA: $f^2 = .03$; $\alpha = .05$; $ß = .90$; 4 groups, 3 predictors, 3 outcomes). We expected a small effect for the experimental manipulation in accordance with our former results in similar studies (own citation, 2022; own citation, 2023). The analysis resulted in a required sample size of at least 224 participants. We stopped recruitment after 270 participants to account for possible exclusions and still achieve adequate power. Participants

were recruited throughout Germany via e-mail distribution lists of universities. Inclusion criteria were good German language skills and legal age. As compensation, participants could receive course credit or take part in a raffle for 4 x 25€ vouchers.

Randomization

The 20-minute online experimental study was conducted via SoSciSurvey as a 2x2 between-subjects design. The predictors *valence* (negative vs. positive) and *controllability* of expectation violation (high vs. low) were manipulated, resulting in four experimental groups: positive valence & high controllability, positive valence & low controllability, negative valence & high controllability, and negative valence & low controllability. Participants were randomly assigned to one of the four experimental groups by computer without their knowledge.

Procedure

At the beginning of the study, sociodemographic data and personality traits (academic self-concept and need for cognitive closure) were collected. Subsequently, the participants received instructions on how to process the case vignettes. They were informed that in the following, they would be presented with four different scenarios from the university context. Their task was to read them and to imagine how they would behave in the situation described. Each group received the same four scenarios (exam grade, job interview, lecture, written assignment), which differed only in the manipulated valence and controllability. The case vignettes consisted of 8-10 sentences and described a positive or negative expectation violation whose outcome could either have been controlled or not affected by the participant (see Supplementary Material, Appendix A). After each case vignette, subjects were asked about how they would have coped with the described situation. At the end of the questionnaire, a scale for self-enhancement was additionally presented; here, the participants were instructed to recall the four case vignettes and answer accordingly to how they felt about the situation. Finally, a manipulation check was performed for controllability and valence, and questions were asked about the processing of the study (seriousness, presumed study goal). After the questionnaire was completed, we informed the participants about the actual purpose of the study.

Measures

Socio-Demographics

We assessed age, gender, field and current semester of study.

Academic Self-Concept

We assessed the academic self-concept with the „General academic self-concept" scale from Arens et al. (2021). The scale consisted of three items (e.g. "My performance at university has been good so far“) and was measured on a 7-point Likert scale from 1 = strongly disagree to 7 = strongly agree. Cronbach's alpha was good with α = .83.

Need for Cognitive Closure

NCC was assessed with the 16 NCCS (Schlink & Walther, 2007). The scale contains 16 items (e.g. "I do not like unpredictable situations"). As a rating scale, we used a 7-point Likert format from 1 = strongly disagree to 7 = strongly agree. Cronbach's alpha was good with α = .79.

Coping Strategies

After each case vignette, nine items were used to assess coping with the presented expectation violations. Two items addressed assimilation (e.g. "I will align my efforts with my expectations on the next exam."), three items addressed accommodation (e.g. "On the next exam, I will change my expectation according to my actual performance"), and three items were related to immunization (e.g. „The feedback I received in the exam was an exception“). These nine items were previously used in other studies (own citation, 2022; own citation, 2023) and were adapted to the four scenarios. In the end, the items on each of the three coping styles were combined, so that assimilation was assessed with a total of eight items and accommodation and immunization with 12 items each. Participants responded on a 7-point Likert scale from 1 = strongly disagree to 7 = strongly agree. Cronbach's alpha was very good for all three scales with α = .89 for accommodation, α = .86 for assimilation, and α = .87 for immunization.

Self-Enhancement

At the end of the survey, we presented the five items of the Self-Enhancement subscale „Favorable Construals“ (Hepper et al., 2013) to elicit self-enhancement (e.g., "You think of yourself as generally possessing positive personality traits or abilities to a greater extent than most people"). Again, self-enhancement was assessed with a 7-point Likert scale ranging from 1 = strongly disagree to 7 = strongly agree. Cronbach's alpha was good with α = .80.

Manipulation Check

To be able to attribute effects of valence and controllability to the manipulation, we

controlled for whether the manipulated variables induced the intended differences at the end of the study.

In the manipulation control of valence, participants rated the outcome of the scenarios on a 7-point Likert scale from 1 = very negative to 7 = very positive ("How did you feel about the outcome of the situations described?").

To assess the degree of induced controllability, subjects were also asked to indicate how controllable they felt the situation was on a 7-point Likert scale from 1 = very little to 7 = very much (e.g., "How much do you think you could have influenced the outcome of the situations described?").

Data analysis

To calculate main statistical effects of the predictors *valence* and *controllability* and interaction effects with the covariates NCC and self-enhancement, we performed a MANCOVA with the three coping strategies accommodation, assimilation, and immunization as outcomes at a significance level of 5%.

Results

Participants

From n = 270 participants, we had to exclude a total of 21 due to different reasons. First of all, 6 of them stated that they had not seriously answered the questions in the study. In addition, there were 11 participants who showed an unusual response pattern (RSI time > 2). Data sets with a value in the range of RSI Time 2 and above should be viewed critically as their response pattern is considered as “too fast, too straight, too weird” (Leiner, 2019). Afterwards, we checked for univariate outliers via Box-Whisker plots and for multivariate outliers via Mahalanobis Distance (p < .001). We did not exclude univariate outliers, but only three data sets that were considered extreme values. Furthermore, we excluded one multivariate outlier from the analysis. Our final sample consisted of n = 249 participants. Our participants were mainly young adults (M = 22.93, SD = 3.94), identified with female gender (n_{female} = 194 (78%), n_{male} = 46 (19%), $n_{diverse}$ = 6 (2%), n_{other} = 3 (1%)) and were currently in the fourth semester (M = 4.08, SD = 3.06).

Manipulation Check

To ensure that the experimental groups differed in perceived valence and controllability, we

conducted two manipulation checks. First, we compared positive valence and negative valence groups. We found the intended significant difference between both groups ($T(247) = -24.94$, $p < .001$). Participants with negative expectation violations reported significantly less positive valence compared with participants with positive expectation violations ($M_{negative} = 2.49$, $SD_{negative} = 0.96$ vs. $M_{positive} = 5.74$, $SD_{positive} = 1.09$). We conclude that the manipulation of valence was successful.

Second, we compared high controllability and low controllability groups. We found the intended significant difference between both groups ($T(247) = -10.60$, $p < .001$). Participants with less controllable expectation violations reported significantly less perceived controllability compared with participants with higher controllable expectation violations ($M_{low} = 4.00$, $SD_{low} = 1.36$ vs. $M_{high} = 5.67$, $SD_{high} = 1.11$). Therefore, we conclude that the manipulation of controllability was successful, although mean differences are smaller compared with the manipulation of valence.

MANCOVA – Main Effects

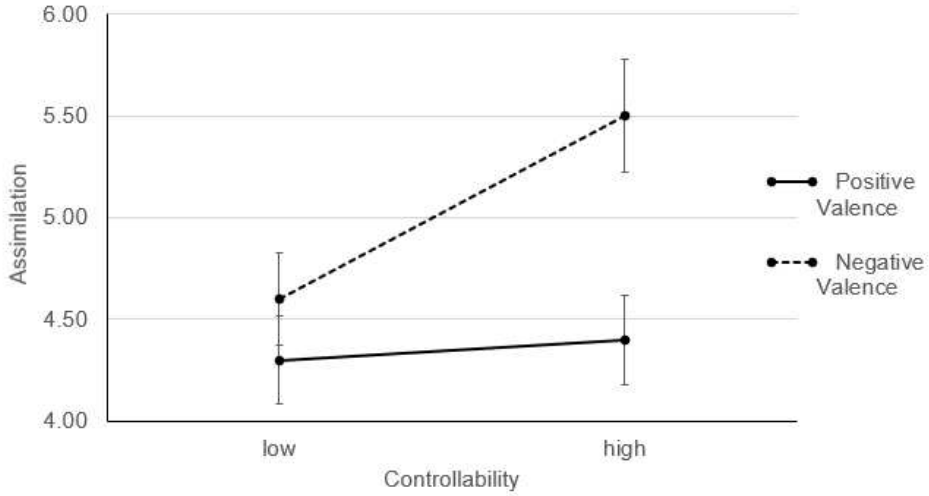
We evaluated the main effects of our predictors *valence* and *controllability* as well as of our covariate NCC on accommodation, assimilation, and immunization. Valence was a significant predictor in the total model (Wilk's $\Lambda = 0.91$, $F(3, 239) = 8.13$, $p < .001$, $\eta_p^2 = 0.09$). Valence significantly predicted all three coping strategies with accommodation ($F(1, 241) = 6.87$, $p = .009$, $\eta_p^2 = 0.03$), assimilation ($F(1, 241) = 4.30$, $p = .04$, $\eta_p^2 = 0.02$) and immunization ($F(1, 241) = 18.09$, $p < .001$, $\eta_p^2 = 0.07$). Interestingly, the participants in the negative valence group reported higher levels of all three coping strategies (Accommodation: $M_{neg} = 4.62$, $SD_{neg} = 1.09$ vs. $M_{pos} = 4.38$, $SD_{pos} = 1.04$; Assimilation: $M_{neg} = 5.06$, $SD_{neg} = 1.03$ vs. $M_{pos} = 4.35$, $SD_{pos} = 0.98$; Immunization: $M_{neg} = 4.03$, $SD_{neg} = 0.98$ vs. $M_{pos} = 3.65$, $SD_{pos} = 1.21$). Controllability was also a significant predictor in the total model (Wilk's $\Lambda = .95$, $F(3, 239) = 4.38$, $p = .005$, $\eta_p^2 = 0.05$). Controllability significantly predicted all three coping strategies with accommodation ($F(1, 241) = 7.67$, $p = .006$, $\eta_p^2 = 0.03$), assimilation ($F(1, 241) = 4.02$, $p = .046$, $\eta_p^2 = 0.02$), and immunization ($F(1, 241) = 5.41$, $p = .021$, $\eta_p^2 = 0.02$). With higher controllability, participants reported stronger accommodation ($M_{low} = 4.47$, $SD_{low} = 1.04$ vs. $M_{high} = 4.53$, $SD_{high} = 1.11$) and assimilation ($M_{low} = 4.48$, $SD_{low} = 0.95$ vs. $M_{high} = 4.94$, $SD_{high} = 1.13$, but less immunization ($M_{low} = 4.17$, $SD_{low} = 0.99$ vs. $M_{high} = 3.47$, $SD_{high} = 1.13$). Also, the covariate NCC was a significant predictor in the total model (Wilk's $\Lambda = .95$, $F(3, 239) = 3.98$, $p = .009$, $\eta_p^2 = 0.05$). Higher NCC significantly predicted

stronger assimilation (F(1, 241) = 4.18, p = .042, η_p^2 = 0.02) and stronger immunization (F(1, 241) = 5.301, p = .022, η_p^2 = 0.02), but was not a significant predictor of accommodation (F(1, 241) = 0.342, p = .559, η_p^2 = 0.00).

MANCOVA – Interaction effects

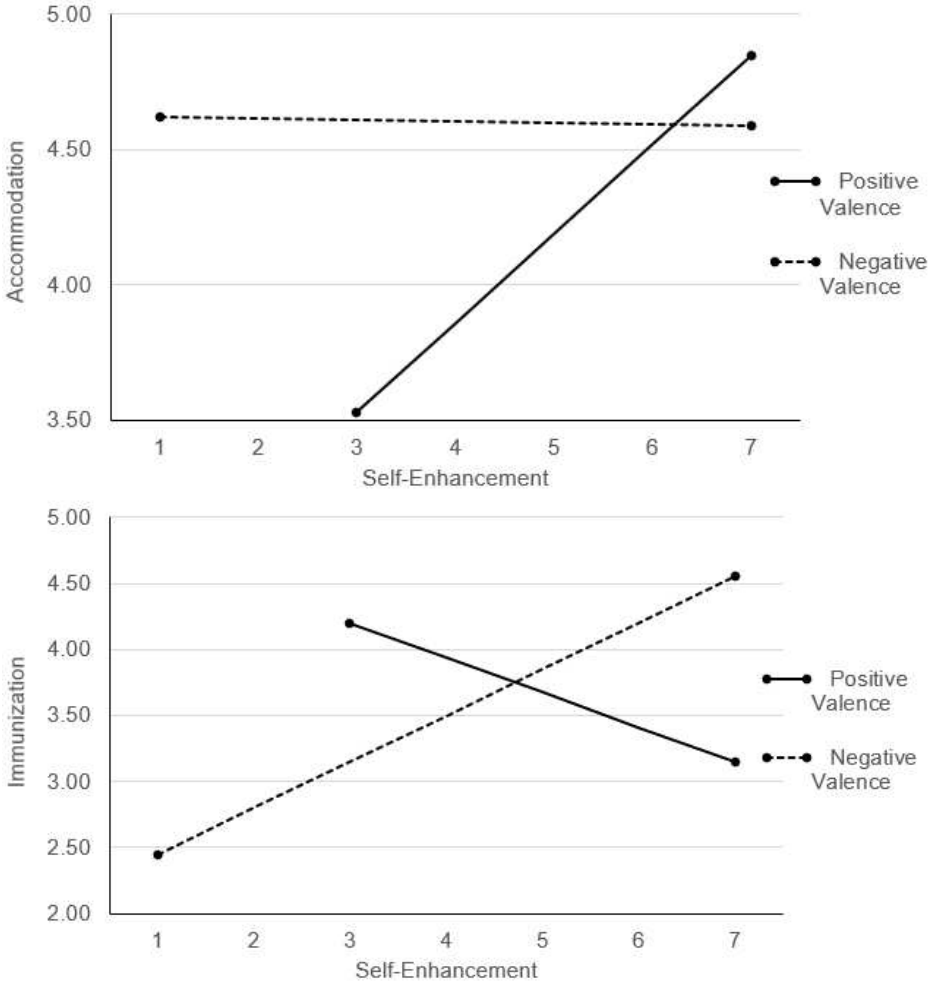
We evaluated interaction effects between valence and controllability, between controllability and NCC, and between valence and self-enhancement. The interaction effect of valence and controllability was a significant predictor in the total model (Wilk's Λ = .95, F(3, 239) = 4.53, p = .004, η_p^2 = 0.05) and predicted assimilation (F(1,241) = 11.64, p = .001, η_p^2 = 0.05), but neither accommodation (F(1,241) = 0.01, p = .919, η_p^2 = 0.00) nor immunization (F(1,241) = 0.36, p = .547, η_p^2 = 0.00). Participants reported stronger assimilation after perceiving a negative and uncontrollable expectation violation (see Figure 1).

Fig. 1 Valence-Dependent Effects of Controllability on Assimilation



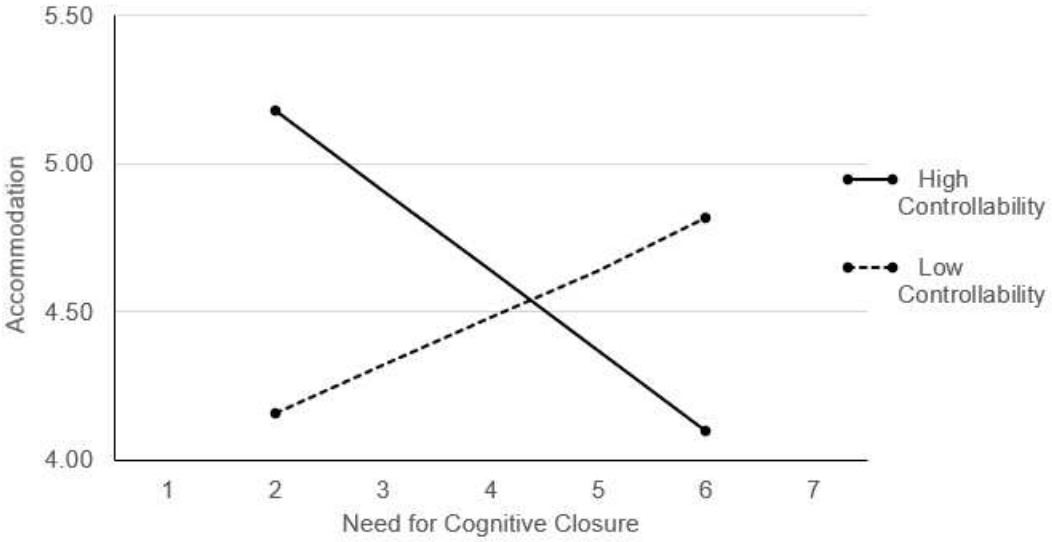
The interaction effect of valence and self-enhancement was a significant predictor in the total model (Wilk's Λ = .87, F(3, 239) = 5.81, p < .001, η_p^2 = 0.07) and predicted accommodation (F(2, 241) = 5.04, p = .01, η_p^2 = 0.04) and immunization (F(2, 241) = 12.75, p < .001, η_p^2 = 0.10). Individuals with higher self-enhancement reported stronger accommodation after positive valence of expectation violation. For immunization, experiencing an expectation violation with negative valence led to increasing immunization in individuals with higher self-enhancement. In contrast, experiencing an expectation violation with positive valence led to decreasing immunization in individuals with higher as compared to lower self-enhancement (see Figure 2).

Fig. 2 Valence-Dependent Effects of Self-Enhancement on Accommodation and Immunization



The interaction effect of controllability and NCC was also a significant predictor in the total model (Wilk's Λ = .96, $F(3, 239) = 2.97$, $p = .033$, $\eta_p^2 = 0.04$) and predicted accommodation ($F(1,241) = 7.45$, $p = .007$, $\eta_p^2 = 0.03$), but neither assimilation ($F(1,241) = 1.75$, $p = .187$, $\eta_p^2 = 0.01$) nor immunization ($F(1,241) = 1.87$, $p = .173$, $\eta_p^2 = 0.01$). NCC and controllability showed two significant interaction effects: individuals with low NCC accommodated more strongly in a controllable situation, whereas individuals with high NCC accommodated more strongly in an uncontrollable situation (see Figure 3).

Fig 3. Interaction Effect of NCC and Controllability on Accommodation



Further Analysis

Because the case vignettes referred strongly to the academic context, we explored how academic self-concept correlated with our covariates and outcomes. Students with more positive ASC also reported stronger self-enhancement (r = .21, p = .001). Furthermore, academic self-concept was negatively correlated to NCC (r = - .15, p = .02), indicating that students with a higher NCC perceive themselves as less positive in the academic context. All correlations can be found in the supplementary material (Appendix B).

Discussion

Adaptive coping with unexpected successes and failures is crucial for a promising academic career. In our study, we examined coping with expectation violations in the educational context using case vignettes. The aim was to better understand the mechanisms behind the asymmetrical coping with better- versus worse-than expected feedback and the contextual effects of NCC on coping. For stronger accommodation and less immunization after a positive expectation violation, our study identified stronger self-enhancement as a promoting condition. For stronger assimilation after a negative expectation violation, our study identified higher controllability of the expectation violation as a promoting condition. NCC predicted stronger expectation maintenance, but in uncontrollable situations, individuals with higher NCC reported stronger accommodation.

Is there an Optimism Bias in Coping with Violated Academic Expectations?

In the educational context, previous studies have only been able to confirm expectation maintenance after an expectation violation with negative valence. Positive valence, on the other

hand, was not related to stronger expectation update (own citation, 2022; own citation, 2023; Hobbs et al., 2022). The present main effects supported the results related to negative valence: after worse-than-expected feedback, students reported expectation maintenance as well as stronger assimilation and immunization. For stronger immunization, this means that individuals tend to devalue or deny the expectation violation, for example by considering the worse-than-expected grade to be an exception. For stronger assimilation, this means that after a worse-than-expected grade, they reported adjusting the behavior to reduce the likelihood of a renewed expectation violation in the future, for example through higher learning effort. However, stronger assimilation also depends on whether students themselves are responsible for the poorer grade: stronger assimilation is particularly shown if the expectation violation was highly controllable. Practically, this means that if a grade is worse-than-expected because the student was underprepared for the exam, students are more likely to adjust their learning behavior next time to decrease the possibility of another expectation violation. Higher controllability was associated with less immunization, presumably because students cannot easily devalue or deny an expectation violation that they are personally responsible for. Thus, for negative valence, it can be summarized that consistent with the optimism bias (Sharot, 2011), students report stronger expectation maintenance. Higher controllability promotes active behavior change and reduces denial and devaluation.

Although the main effects of our study contradicted stronger expectation update after an expectation violation with positive as compared to negative valence, we found that higher self-enhancement following better-than-expected feedback is necessary to show stronger accommodation. Individuals only adjust their expectations when they show a stronger tendency for self-enhancement after better-than-expected feedback. This is consistent with our finding that students with stronger self-enhancement report less immunization after better-than-expected feedback. Thus, individuals do not devalue the positive feedback but process it and therefore adjust their expectations for the future. For better-than-expected feedback, it can be summarized that positive feedback is not sufficient for promoting accommodation. Consistent with the optimism bias, students with stronger self-enhancement report stronger accommodation and less denial or devaluation after better-than-expected feedback.

Our first research question, whether there is also an optimism bias in the educational context, can thus be answered as follows: yes, but the optimism bias depends on situational and dispositional influences. Students report stronger expectation maintenance after negative compared with positive valence, but show increased assimilation mainly in controllable situations. Students report stronger expectation update after positive valence only when they have a stronger tendency to self-enhance.

Does Higher NCC lead to Context-Dependent Differences in Coping?

NCC implies a preference for clear and unambiguous situations and stronger aversion to uncertainty (Kossowska et al., 2019). This preference has so far led to the somewhat controversial result that individuals reported both more accommodation and assimilation after an expectation violation (own citation, 2022; own citation, 2023). This is presumably a combined strategy that relates in large part to the avoidance of future disappointment. It leads to both an adjustment of behavior in order to meet prior expectations in the future in the event of a previously lower grade, and an adjustment of expectation in order not to fail the expectation again in the future.

In our current study, we found that NCC was only related to stronger expectation maintenance (assimilation and immunization), but not to stronger accommodation. Although this result is in line with previous assumptions (see own citation, 2021), it contradicts our prior results on how individuals with higher NCC cope with expectation violations (own citation, 2022; own citation, 2023). Nevertheless, our study also provides an explanation for the lack of expectation update: an effect of higher NCC on stronger accommodation was evident only when expectation violation was low in controllability. This confirms that the results of NCC are strongly context-dependent (Kemmelmeier, 2015). Moreover, our study includes a relevant implication to our previous findings that NCC leads to significant differences in coping especially when the valence of expectation violation is negative. The negative correlation between the ASC and NCC indicates that individuals with higher NCC are more likely to doubt their academic abilities. Thus, negative feedback may represent a particularly aversive situation that requires adaptive coping.

In sum, higher NCC is associated with expectation maintenance in our study. However, higher NCC can also lead to stronger accommodation and thus expectation update in an uncontrollable situation. Consequently, the effects of higher NCC are dependent on the context of

expectation violation.

Do our Results Indicate Adaptive or Maladaptive Coping?

Optimism bias has been controversial in previous research: it has been associated with both positive and negative outcomes in past studies (Bortolotti & Antrobus, 2015; Carver & Scheier, 2015; Sharot & Garrett, 2016). Coping adaptivity is related to situational and dispositional influences. In particular, controllability influences the adaptiveness of optimism bias: with higher controllability, optimism leads to less stress and depression (Ruthig et al., 2009) and fewer drop-outs during the course of study (Respondek et al., 2017). In general, higher controllability is associated with positive academic cognitions (Ruthig et al., 2007). Our results support these assumption, and many of our findings point to adaptive coping behaviors when controllability is high: higher controllability led to more accommodation and assimilation, but less immunization. With negative performance feedback and high controllability, students reported more assimilation.

With positive performance feedback, self-enhancement emerged as a critical requirement for stronger accommodation. In a longitudinal study, self-enhancement also proved to be an adaptive influence and led to higher well-being (Dufner et al., 2015). Furthermore, overly optimistic expectations are likely to motivate students to strive for higher achievement goals (Ruthig et al., 2007). Our finding that higher self-enhancement and positive valence lead to stronger accommodation and less immunization can be understood as adaptive coping. Thus, it can be concluded that optimism bias associated with controllable characteristics relevant to the academic self leads to adaptive coping that makes future expectation violations and disappointments less likely.

In light of this, the interaction effect found between NCC and uncontrollability on accommodation should be viewed critically. We found stronger expectation maintenance in case of higher NCC, except when the situation was uncontrollable: here, individuals with higher NCC were more likely to change their expectations than individuals with lower NCC. There are different conclusions regarding the adaptivity of stronger accommodation for individuals with higher NCC in uncontrollable situations that point to the need for further research. First, it is important to consider that for individuals with high NCC, uncertainties and discrepancies are particularly unpleasant, and coping is particularly adaptive for them if it resolves this aversive state as quickly as possible (e.g.

Schrackmann & Oswald, 2014). Whether expectation update is adaptive or not depends largely on whether expectation change makes a future violation of expectation less likely or more likely. In an uncontrollable situation, it is decisive to consider whether similar expectation violations are likely to occur in the future (e.g., same instructor on the next exam) or whether this would be rather unlikely (e.g., different instructor on the next exam). In the former case, accommodation would be the adaptive strategy to eliminate uncertainty and dissonance as quickly as possible and simultaneously reduce the likelihood of future expectation violations. In the second case, accommodation would be a maladaptive strategy because, although uncertainty and dissonance would be eliminated in the near term, future expectation violations and thus aversive situations would be more likely.

In educational practice, adaptive coping with expectation violations can be promoted by supporting students' perceived controllability. In particular, performance feedback should refer to controllable aspects of achievement and include suggestions on how to improve performance. Furthermore, it should be ensured that predictability and control exist in performance situations: requirements, assessment criteria, and feedback should be communicated transparently and unambiguously in exams or papers. Successes and failures should be reported constructively and promptly, and expectations for students should be clearly articulated (see also Respondek et al., 2017). Preventing low controllability may also counteract possible maladaptive coping by students with high NCC.

Limitations and Future Directions

In our study, we used case vignettes to test scenarios that were as close to academic reality as possible in a standardized, experimental context. This has already been successfully applied in other studies on the manipulation of expectation violations (Gesualdo & Author, 2022; Kube et al., 2022). Nevertheless, we induced hypothetical expectation violations and the results may not be fully transferable to real expectation violations. A stronger real-life focus would require studies conducted in educational contexts in cohorts before and after exam periods to examine how students cope with expectation-violating outcomes. However, this approach is not readily feasible and entails less standardization.

Manipulating controllability posed a difficulty in our study. Much theoretical and

experimental work indicates that subjectively perceived controllability may differ from objective controllability (for review, see Robinson & Lachmann, 2017). Our experimental groups differed significantly in perceived controllability, yet the low controllability group had a mean score in the middle range of the scale with single outliers to the top.

However, the important starting point for future research should be to directly capture the adaptivity of coping behavior. Here, special attention should be paid to the effects of higher NCC and it should be directly determined whether the strategies applied to prevent expectation violations in the future.

Conclusion

Students often experience expectation violations in the course of their educational pathway and need to adaptively cope with them for a successful academic career. Coping according to the optimism bias can be beneficial and lead to positive, motivating expectations after successes and persistent positive expectations despite failures. Our study supports these findings, but also shows that certain conditions must be met for students to use adaptive coping. High controllability has an adaptive effect on coping with worse-than-expected feedback, and high self-enhancement is necessary to integrate unexpected positive achievement into future educational expectations. Students with high NCC exhibit potentially maladaptive tendencies because their need for rapid resolution of uncertainty may promote future expectation violations inducing aversive uncertainty again. Given the negative association between ASC and NCC that we identified, affected students may be particularly vulnerable.

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Appendix A

Translated from German to English by Larissa Henss and Annika Vockeroth

Vignette 1

Positive Valence, Low Control

You are talking to people from a higher semester about an upcoming exam. They tell you that the questions have very little to do with the content of the lecture. They say that it is disproportionately difficult to pass the exam because one cannot prepare well. In the weeks leading up to the exam, you study as much as usual. Your poor performance on the practice exam two weeks before the actual exam confirms the impression that the questions are unpredictable. You expect to receive a lower grade than usual in the exam due to your poor performance on the practice exam and its difficulty. During the exam, you are focused, but as expected, the questions are not based on the content of the lecture and therefore difficult to answer. When you receive the exam results after a few weeks, your grade is surprisingly better than expected.

Positive Valence, High Control

You are talking to people from a higher semester about an upcoming exam. They tell you that the questions have a lot to do with the content of the lecture. They say that it is easy to get a good grade because one can prepare well. You are happy about this and study less than usual. However, you perform poorly on a practice exam two weeks before the actual exam. As a result, you study intensively for the exam during the remaining time. You expect to receive a lower grade than usual in the exam due to your poor performance on the practice exam. During the exam, you realize that, as expected, the questions match the content of the lecture, that you have prepared well, and that you have sufficiently learned the content of the lecture. When you receive the exam results after a few weeks, your grade is better than initially expected.

Negative Valence, High Control

You are talking to people from a higher semester about an upcoming exam. They tell you that the questions have a lot to do with the content of the lecture. They say that it is easy to get a good grade because one can prepare well. You are happy about this and study less than usual before the exam. Your good performance in the practice exam two weeks before the actual exam confirms the impression that the questions are easy to answer. You expect to receive a better grade than usual in the exam due to your good performance in the practice exam and its easiness. During the exam, you realize that, as expected, the questions match the content of the lecture, but you have not prepared well enough and have not sufficiently learned some of the content of the lecture. When you receive the exam results after a few weeks, your grade is worse than expected.

Negative Valence, Low Control

You talk to people from a higher semester about an upcoming exam. They tell you that the questions have very little to do with the content of the lecture. They say that it is disproportionately difficult to get a good grade, because one cannot prepare well. In the weeks leading up to the exam, you study a lot. In the practice exam two weeks before the actual exam, you perform well. This result makes you optimistic and you expect to receive an acceptable grade in the exam due to your performance in the practice exam. During the exam, you are focused, but as expected, the questions are not based on the content of the lecture and therefore difficult to answer. When you receive the exam results a few weeks later, your grade is worse than expected.

Coping Vignette 1

In the next exam, I will align my efforts with my expectations.
I will prepare myself for the next exam, so that my performance matches my expectations.
In the future, I will try to estimate my performance more realistically.
I will reevaluate my own performance expectations.
For the next exam, I will adjust my expectation of the exam result.
The result of the exam was an exception.
The result of the exam is not significant.
The exam result does not reflect my actual abilities.

Vignette 2

Positive Valence, Low Control

In a seminar, you and your group have to give a graded presentation. The groups are randomly assigned and each person has to contribute equally to the presentation. During the preparation time, you notice that your group members are not motivated at all and that their contributions to the group work do not meet your expectations. There hasn't been a single group meeting to prepare for the presentation. Due to the lack of engagement from your group, you are not motivated anymore. The day of the presentation is approaching and you feel like it is going to be a complete disaster. You expect a bad grade. During the presentation, you notice that the performance of the whole group is not particularly good and you prepare yourself for bad feedback. To your surprise, the lecturer finds that you did well, praises your relaxed presentation style, and gives you a better grade than you expected.

Positive Valence, High Control

In a seminar, you and your group have to give a graded presentation. The groups are randomly assigned and each person has to contribute equally to the presentation. During the preparation time, you notice that your group members are not motivated at all and that their contributions to the group work do not meet your expectations. There hasn't been a single group meeting to prepare for the presentation. Despite the lack of engagement from your

group, you are motivated to give a good presentation. The day of the presentation is approaching and you feel like it is going to be a complete disaster. You expect a bad grade. Because of the poor preparation of your group, you make some notes on all topics of the presentation. During the lecture, due to your preparation, you can present your part very confidently and are able to answer further questions on other parts. The lecturer finds your presentation, and especially your part, to be very well done, praises your relaxed presentation style, and gives you a better grade than you expected.

Negative Valence, High Control

In a seminar, you and your group have to give a graded presentation. The groups are randomly assigned and each person has to contribute equally to the presentation. During the preparation time, you notice that your group members are very motivated and prepare their contributions as you expect them to. You managed to meet a few times as a group to prepare for the presentation. The day of the presentation is approaching and you feel that it will be a complete success. You expect to receive a very good grade. Because of the thorough preparation, you choose not to make any notes to support your presentation. During the presentation, you realize that you cannot present your part freely and have to start your sentences over and over again. The lecturer then finds the presentation, and especially your part, to be not satisfactory, criticizes your stiff presentation style, and gives you a lower grade than you expected.

Negative Valence, Low Control

In a seminar, you and your group have to give a graded presentation. The groups are randomly assigned and each person has to contribute equally to the presentation. During the preparation time, you notice that your group members are very motivated and prepare their contributions as you expect them to. You managed to meet a few times as a group to prepare for the presentation. The day of the presentation is approaching and you feel that it will be a complete success. You expect to receive a very good grade. During the presentation, you have the impression that the performance of the whole group is good and you prepare yourself for positive feedback. Unfortunately, the lecturer does not find your presentation satisfactory, criticizes your stiff presentation style, and gives you a lower grade than you expected.

Coping Vignette 2

In the next presentation, I will align my efforts with my expectations.

I will prepare myself for the next presentation, so that my performance matches my expectations.

In the future, I will try to estimate my performance more realistically.

I will reevaluate my own performance expectations.

For the next presentation, I will adjust my expectation to match my actual performance.

The feedback on the presentation was an exception.
The feedback on the presentation is not significant.
The result of the presentation does not reflect my actual abilities.

Vignette 3

Positive Valence, Low Control

You are writing a report for a seminar that you are very interested in. You have participated in almost all seminar sessions and at the end, a graded written assignment must be handed in. In the last session of the seminar, the design of the assignment is discussed, but the lecturer does not specify any content requirements. You feel that you are not able to write about the topic in a way that matches his expectations. Ultimately, you guess what content should probably be included. Just before the deadline, you realize in a conversation with the other students that they have set different priorities. However, it is now too late to change everything. Therefore, you expect to receive a lower grade than usual. After a few weeks, your classmates ask you if you have seen your grade yet, as some of them cannot understand the evaluation. Nervously, you look at your grade, but then are relieved once you see that your good grade has exceeded your expectations. You have also received an email from the lecturer, who compliments you for having implemented his requirements.

Positive Valence, High Control

You are writing a report for a seminar that you are very interested in. You have participated in almost all seminar sessions and at the end, a graded written assignment must be handed in. In the last session of the seminar, the design of the assignment is discussed, and the lecturer specifies clear content requirements. You feel that you are able to write about the topic in a way that matches his expectations. You work hard to complete the assignment according to the requirements. Just before the deadline, you realize in a conversation with the other students that you are the only one who has set a different priority. However, it is now too late to change everything. Therefore, you expect to receive a lower grade than usual. After a few weeks, your classmates ask you if you have seen your grade yet, as they found the evaluation to be very strict. Nervously, you look at your grade, but are relieved once you see that your grade has exceeded your expectations. You have also received an email from the lecturer, who compliments you for having implemented his requirements.

Negative Valence, High Control

You are writing a report for a seminar that you are very interested in. You have participated in almost all seminar sessions and at the end, a graded written assignment must be handed in. In the last session of the seminar, the design of the assignment is discussed, and the lecturer specifies clear content requirements. You feel that you are able to write about the topic in a way that matches his expectations. However, you also have your own idea about it

and in the end, you produce the assignment according to your own convictions. Just before the deadline, you realize in a conversation with the other students that they have set different priorities. However, you think that your approach is better suited. Therefore, you expect to receive a good grade. After a few weeks, your classmates ask you if you have seen your grade yet, as they found the evaluation to be very generous. Excitedly, you look at your grade, but are disappointed once you see that your grade does not meet your expectations. You also received an email from the lecturer who regrets that you did not implement his requirements.

Negative Valence, Low Control

You are writing a report for a seminar that you are very interested in. You have participated in almost all seminar sessions and at the end, a graded written assignment must be handed in. In the last session of the seminar, the design of the assignment is discussed, but the lecturer does not specify any content requirements. You feel that you are not able to write about the topic in a way that matches his expectations. Even when you inquire about this in an email, you do not receive any help. Ultimately, you guess what content should probably be included. Just before the deadline, you realize in a conversation with the other students that they have set similar priorities. You are relieved and expect to receive a good grade. After a few weeks, your classmates ask you if you have seen your grade yet, as some of them cannot understand the evaluation. Eagerly, you look at your grade, but then are disappointed once you see that your grade does not meet your expectations. You also received an email from the lecturer who regrets that you did not implement his requirements.

Coping Vignette 3

For the next report, I will align my efforts with my expectations.
I will prepare myself for the next report, so that my performance matches my expectations.
In the future, I will try to estimate my performance more realistically.
I will reevaluate my own performance expectations.
For the next report, I will adjust my expectations to match my actual performance.
The feedback on the report was an exception.
The feedback on the report is not significant.
The grade of the report does not reflect my actual abilities.

Vignette 4

Positive Valence, Low Control

In a seminar, the lecturer informs you that she is looking for a student assistant in the department. You enjoy the seminar, but you do not meet all the requirements listed in the job advertisement. Additionally, you have been rather reserved in the seminar so far. Therefore, you do not expect to get the job. Nevertheless, you want to try and write to your lecturer. You

are invited for a short interview. But during the meeting, suddenly questions are asked about topics that are only covered in higher semesters and you are completely overwhelmed. You get some things mixed up and cannot answer many of the questions. After the meeting, you are told that despite your negative expectations, you got the job.

Positive Valence, High Control

In a seminar, the lecturer informs you that she is looking for a student assistant in the department. You enjoy the seminar, but you do not meet all the requirements listed in the job advertisement. Some of these requirements relate to content that will only be covered in higher semesters. Additionally, you have been rather reserved in the seminar so far. Therefore, you do not expect to get the job. Nevertheless, you want to try and write to your lecturer. You are invited for a short interview. During the meeting, you are asked questions about topics that were communicated to you beforehand and that you are well prepared for. Although you didn't know some topics from future semesters, you have still worked on them. You can therefore answer the difficult questions much better than you thought. After the meeting, the lecturer tells you that, contrary to your negative expectations at the beginning, your answers were very convincing and that you got the job.

Negative Valence, High Control

In a seminar, the lecturer informs you that she is looking for a student assistant in the department. You enjoy the seminar and you think that you are very qualified based on your previous experience in your studies. Additionally, you were able to repeatedly stand out with good answers in the seminar. Therefore, you expect that you have a good chance of getting the job. You write to your lecturer and are invited for an interview. During the meeting, you are asked questions about topics that were communicated to you beforehand and that you could have prepared yourself for. However, since you already knew the topics from past semesters, you did not work on them. As a result, you get some things mixed up and cannot answer many of the questions. After the meeting, you are told that, contrary to your original expectation, you are not suitable for the position.

Negative Valence, Low Control

In a seminar, the lecturer informs you that she is looking for a student assistant in the department. You enjoy the seminar and you think that you are very qualified based on your previous experience in your studies. Additionally, you were able to repeatedly stand out with good answers in the seminar. Therefore, you expect that you have a good chance of getting the job. You write to your lecturer and are invited for an interview. But during the meeting, suddenly questions are asked about topics that are only covered in higher semesters and you are completely overwhelmed. Therefore, you cannot answer the questions sufficiently. After the meeting, you are told that, contrary to your original expectation, you are not suitable for the position.

Coping Vignette 4

For the next job application, I will align my efforts with my expectations.

I will prepare myself for the next job application, so that my performance matches my expectations.

In the future, I will try to estimate my performance more realistically.

I will reevaluate my own performance expectations.

For the next job application, I will adjust my expectations to match my actual performance.

The feedback from the job interview was an exception.

The feedback from the job interview is not significant.

The feedback received from the lecturer does not reflect my actual abilities.

Appendix B

Correlations

		ASC	NCC	Self-Enhancement	Assimilation	Accommodation	Immunization
ASC	Correlation (Pearson)	1	-.153*	.214**	.031	-.032	.005
	p-Value		.02	.001	.62	.62	.94
NCC	Correlation (Pearson)	-.153*	1	-.193**	.136*	-.031	.104
	p-Value	.02		.002	.03	.63	.10
Self-Enhancement	Correlation (Pearson)	.214**	-.193**	1	.089	.130*	.071
	p-Value	.001	.002		.16	.04	.27
Assimilation	Correlation (Pearson)	.031	.136*	.089	1	.364**	-.073
	p-Value	.62	.03	.16		.001	.25
Accommodation	Correlation (Pearson)	-.032	-.031	.130*	.364**	1	-.088
	p-Value	.62	.63	.04	.001		.16
Immunization	Correlation (Pearson)	.005	.104	.071	-.073	-.088	1
	p-Value	.94	.10	.27	.25	.16	

Notes. *. $p < .05$ and **. $p < .01$

Die Seiten 111-112 (Lebenslauf) enthalten persönliche Daten. Sie sind deshalb nicht Bestandteil der Online-Veröffentlichung.

Eidesstattliche Erklärung

Ich versichere, dass ich meine Dissertation

Dispositional and Situational Predictors of Coping with Expectation Violations: Experimental Studies on the VioIEx Model

selbständig und ohne unerlaubte Hilfe angefertigt habe und mich dabei keiner anderen als der von mir ausdrücklich bezeichneten Quellen und Hilfen bedient habe. Die Dissertation wurde in der jetzigen oder einer ähnlichen Form noch bei keiner anderen Hochschule eingereicht und hat noch keinen sonstigen Prüfungszwecken gedient.

Marburg, den 22.05.2023

_____

Larissa Henß