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Online First Publication, March 28, 2024. https://dx.doi.org/10.1037/emo0001345

AMERICAN PSYCHOLOGICAL ASSOCIATION

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ISSN: 1528-3542

https://doi.org/10.1037/emo0001345

Negative (but Not Positive) Affective Episodic Future Thinking Enhances Proactive Behavior in 5-Year-Old Children

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Envisioning the future and how you may feel (affective episodic future thinking [EFT]) helps adults to act in favor for their future self, according to manifold experiments. The current study tested whether and how affective EFT also helps children to behave more proactively, that is, to self-initially prepare for an upcoming event. Five-year-old ($N = 90$) children (data collected from 2021 to 2022) were instructed to mentally imagine how they would feel after successfully managing an upcoming test (positive affective EFT), how they would feel after failing to do so (negative affective EFT), or they were reminded of an upcoming test without a prompt to imagine (control condition, random assignment). Proactive behavior was indicated by children's choice to play one of three games before the actual test (one of the games was announced to be the test game). Mechanisms (e.g., motivation to win, psychological distance, current affect) and moderators (ability of episodically thinking about the future in everyday life, behavioral inhibition, and behavioral approach) for the possible effects of affective EFT were explored. Children in the negative affective EFT condition chose the target game significantly above chance level and more often than children in the control group, whereas children in the positive affective EFT condition did not. This effect was independent of the assumed mediators and moderators. Findings are discussed in the context of the theoretical and empirical literature on affective EFT in adults and suggestions for future studies are given.

Keywords: anticipated affect, episodic future thinking, child development, proactive behavior

As manifold studies document, current affective states direct and energize our efforts to solve problems and to take on opportunities that we are currently facing (reactive behavior). Surprisingly often we think about how we will feel in a specific event of our personal future (affective episodic future thinking [EFT]), that is, addressing problems that may occur at a later point in time (Barsics et al., 2016). For example, we anticipate how bad we will feel when failing a test next week and how good we will feel after passing it. What are the functions of such episodic thoughts about anticipated affects? One suggestion is that foreseeing how we will feel helps us to evaluate the desirability of a future outcome and to adapt our current behavior accordingly. In this sense, preexperiencing how we will feel during a specific, upcoming event may help us to behave proactively. Whether and how proactive behavior can be promoted by preexperiencing upcoming feelings is at the heart of the current study. Behaving proactively means to self-initiate actions toward possible

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The study was supported by the Deutsche Forschungsgemeinschaft (DFG, German Research Foundation)—Project GRK-2185/2/Gefördert durch die Deutsche Forschungsgemeinschaft (DFG)—Projektnummer GRK-2185/2 (DFG-Graduiertenkolleg "Situated Cognition"). The authors first of all want to thank all the children and their caregivers for being part of this study. Further, the authors want to thank Yasemin Cigtay-Akar for recruiting the participants, Annegret Deiß for helping to collect the data, Alina Bornkessel and Henrike Sakowski for coding the data, and all members of Research Training Group Situated Cognition, as well as the team of "Mental Health Research and Treatment Center Bochum" in Bochum (Germany) who provided helpful comments during conferences or discussion sessions. The authors report no conflicts of interest to declare. This study was conducted in accordance with the guidelines of the Declaration of Helsinki and was approved by the Ethics Committee of the Ruhr-Universität Bochum (Protocol Code 718, date of approval March 16, 2021). Informed written consent was obtained from all caregivers of the respective child. The authors have reported how they have determined their sample size, all data exclusions, all manipulations, and all measures in the study, and they followed JARS (Kazak, 2018). All data, analysis code, and research materials are available upon request. Analyses of the data took place using SPSS Version 29.0.0.0. This study's design and its analyses were preregistered at aspredicted.org (70994). This study's design and hypotheses were preregistered; see https://aspredicted.org/WBS_G7Q. Data, materials, and analysis code are available upon request from the corresponding author.

Felix Schreiber served as lead for conceptualization, data curation, formal analysis, investigation, methodology, project administration, resources, software, supervision, validation, visualization, writing–original draft, and writing–review and editing. Silvia Schneider served as lead for funding acquisition and served in a supporting role for conceptualization, supervision, and writing–review and editing. Albert Newen served as lead for funding acquisition and served in a supporting role for supervision and writing–review and editing. Babett Voigt contributed equally to conceptualization, funding acquisition, methodology, supervision, writing–original draft, and writing–review and editing and served in a supporting role for data curation.

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upcoming challenges in a way that changes our personal future (Parker & Bindl, 2016). Thus, proactive behavior enables us to take active control of our life and to shape our future. Promoting proactive behavior is of particular interest with respect to young children, a population who (still) struggles with that important skill. One reason why young children rarely act on problems before they actually occur may lay in their limited ability to vividly imagine future feelings before school age. The current study aims at testing this idea by examining the possible beneficial impact of affective EFT on preschool-aged children's proactive behavior.

Preexperiencing how we will feel is one part of EFT; the ability to mentally simulate a specific event of one's personal future (e.g., Atance & O'Neill, 2001). EFT incorporates contextual details (e.g., objects, subjects, location, and time) as well as details about oneself (e.g., internal states). In the following, we will use the term "affective EFT" for the process of putting oneself in an upcoming situation and preexperiencing an upcoming affect or a concrete emotion. Thus, affective EFT differs from affective forecasting in two respects: with regard to the mode of future thinking (simulation vs. prediction) and in terms of the specificity of its form (episodic vs. semantic), following the taxonomy of Szpunar et al. (2014). First, affective forecasting denotes the prediction of the valence, intensity, and duration of upcoming affects, whereas affective EFT is a mental simulation of an upcoming affective experience that is embedded in several other contextual details of the future event. Second, the form of affective EFT is specified to be episodic, whereas affective forecasting can involve episodic and semantic aspects and thus is less specific (Wilson & Gilbert, 2003; for a review see Pilin, 2021).

According to theory, imagining a future event and its possible affective consequences (affective EFT) can increase motivation to achieve a certain outcome, even if that imagination does not focus on how to achieve that goal (Bagozzi et al., 2003; Baumeister et al., 2007; Frijda, 1986; Perugini & Bagozzi, 2001; Wardell et al., 2022). Theoretically, one's motivation to act can result from the possible positive consequences of an event (promotion focus), but also from the wish to avoid the negative consequences of an event (prevention focus; e.g., Bandura, 1982; Elliot et al., 2013; P. M. Gollwitzer, 1999; Higgins, 1998; Lang, 1995; Vasquez & Buehler, 2007). Different areas of psychology provide evidence for such an impact of affective EFT. For example, research from social psychology revealed that students performed better in an everyday academic task (e.g., writing an essay) after imagining how they would succeed in this task, compared to a control group (e.g., Taylor et al., 1998). Clinical studies reported that people with depression anticipate less positive affect and simultaneously show less goal-directed activities (for a review see Hallford et al., 2018). Speaking in favor of a causal link of this relation, engagement in positive activities (or the intention to do so) increased after training to imagine positive affective consequences of upcoming events in patients with depression (e.g., Hallford et al., 2018; see also Du et al., 2022; Moustafa et al., 2018) and in an unselected sample of students (e.g., Ji et al., 2021; see also Hallford et al., 2022). In addition, research in health psychology found that anticipating regret can strengthen people's health-related intentions, predict proactive health behavior (e.g., less meat consumption; Carfora et al., 2017), and support far-sighted economic decisions (e.g., higher retirement savings; Croy et al., 2015). Similarly, Conner et al. (2006) found that preexperiencing higher levels of regret in the context of goal failure predicted a weaker intention to smoke (for a meta-analysis see Rivis et al., 2009). However, some studies could not document an enhancing impact of affective EFT (e.g., Oettingen & Wadden, 1991; Pham & Taylor, 1999) or even found a negative influence on goal-directed behavior (Kappes et al., 2012). In sum, empirical evidence speaks in favor of the idea that preexperiencing affective consequences of an upcoming event (affective EFT) can increase adults' motivation to bring about a certain outcome of an upcoming event thereby facilitating future-oriented behavior. Although contradictory findings are the exception (e.g., Oettingen & Wadden, 1991; Pham & Taylor, 1999), they point to the importance of investigating the mechanisms and moderators of this relation. For example, the somewhat contradictory evidence may point to the possibility that the impact of affective EFT depends on several conditions, for example, that some individuals may benefit from affective EFT more than others.

The extensive research in adults stands in clear contrast to the few studies addressing a possible impact of affective EFT on future-oriented behavior in children. This is surprising, as future-oriented behavior is often described as a major aim of parenting and socialization (e.g., Trommsdorff, 1983). Even more, proactivity has been described as one milestone of childhood development (e.g., Munakata et al., 2012) due to its positive consequences for a wide range of domains such as health-related outcomes and pro-environmental behavior (Dassen et al., 2016; Lee et al., 2020). However, apart from one exception, so far it remains largely unanswered whether and to what extent affective EFT fosters preschool-aged children's abilities to actively shape their future by self-initially preparing for an upcoming event (proactive behavior). Brinums et al. (2023, Experiment 1) compared how long children aged 6–9 years practiced for an upcoming test. They compared two conditions. In the neutral condition, the experimenter prompted children to imagine how they would succeed and what they would think during the announced test later on (promoting EFT). In the experimental condition, children were prompted to imagine how they would succeed and what they would feel in the test (prompting affective EFT according to our definition). No effect of prompting affective EFT was found for 6- and 7-year-old children. Moreover, 8- and 9-year-old children practiced longer for the test after receiving the prompt for affective EFT compared to the neutral condition. However, the effect for older children also vanished after Brinums et al. (2023) eliminated the conditional language (if-statement) from the instructions in the affective EFT condition and used definitive language in the instructions of both conditions in a follow-up experiment. Brinums et al. (2023) discuss that merely prompting affective EFT may not be sufficient to promote proactive behavior in younger children because they may rely on scripts rather than preexperiencing their success in the form of an episodic simulation. Further, Brinums et al. (2023) argue that prompting affective EFT may only help older children in combination with conditional language, as this may help them becoming aware of the possibility that they could fail in the upcoming test. Older children may have practiced more in the affective EFT condition compared to the neutral condition because of their motivation to prevent failure. Alternatively, Brinums et al. (2023) take into consideration that a lack of statistical power may have been responsible for the absence of group differences in the follow-up experiment. So, they do not preclude that 8- and 9-year-olds may prepare more for a future test after being prompted to imagine how well they would feel after succeeding.

First signs of episodically thinking about an upcoming event emerge between the age of 3 and 5 years (e.g., Atance & Meltzoff,

2005; Busby Grant & Suddendorf, 2009; Suddendorf & Busby, 2005). For example, 3-year-old children can generate details about everyday events of the next day or about a hypothetical scenario (Quon & Atance, 2010; Richmond & Pan, 2013). However, direct and specific investigations of preschoolers' competencies in the affective-motivational component of EFT lack so far. Developmental data on related domains such as affective forecasting and emotion understanding may be informative here. On the one hand, it has been shown that already preschool-aged children are capable of correctly predicting the valence of their feelings and the intensity of their positive affect in a specific simple event of their immediate future (Gautam et al., 2017; Kopp et al., 2017). One the other hand, literature documents that emotion understanding continues to develop during middle childhood, especially regarding children's understanding of more complex, discrete emotions and situations that may not allow for the reliance on script-based knowledge (e.g., Baird & Astington, 2004; Doan et al., 2020; Guerini et al., 2020; Lagattuta & Kramer, 2022; McCormack et al., 2016; Nakamichi, 2019; Weisberg & Beck, 2010). For example, up to the age of 8 years, children struggle to correctly predict that they themselves will feel regret later on (McCormack & Feeney, 2015). Thus, it seems likely that also affective EFT continues to develop after preschool years. In addition, due to a lack of direct investigations, it cannot be precluded that younger compared to older children relied on script-based knowledge rather than episodic simulations of their upcoming feelings in the studies of Gautam et al. (2017) and Kopp et al. (2017; see Brinums et al., 2023 for that suggestion). Such particularities regarding affective EFT may be one reason why children before school age usually behave reactively and do not act toward problems that will only occur later. This idea has not been directly tested so far despite the manifold evidence of the role of affective EFT in adult literature.

In accordance with this idea, different lines of research also show a protracted developmental course of proactive behavior that aligns with the described trajectories for emotion understanding and counterfactual emotions. Specifically, preschool-aged children usually still fail to prepare proactively for a future event, that is, they do not initiate action or activate cognitive resources before a problem or an opportunity has manifested (e.g., Gonthier et al., 2019; Munakata et al., 2012). For example, in the spoon task (Suddendorf & Busby, 2005), children learn about an upcoming problem in a room that is empty with one exception (e.g., a reward in a locked box). In a second room, they have the opportunity to select or to save an object among multiple other objects before returning to the first room. Only one object can solve the upcoming problem (e.g., to open the locked box). Many studies using the spoon test reported that children between 4 and 5 years of age acted proactively by choosing or saving the correct object (for a review see Hudson et al., 2011; McCormack & Hoerl, 2020). However, based on more recent research, developmental researchers argue that proactive behavior emerges much later (Atance et al., 2023; Caza et al., 2021; McCormack & Hoerl, 2020). This conclusion aligns with several studies showing that before the age of 6 years, children fail to pass the spoon test (Caza et al., 2021) and do not practice proactively in preparation for an upcoming test even if they receive a respective cue (Brinums et al., 2018; Davis et al., 2016).

Taken together, it seems reasonable to assume that preschool-aged children struggle to (spontaneously) preexperience how they would feel in a specific event in the future. At the same time, they still have problems in acting proactively (e.g., by preparing for future problem or by training for an upcoming test). Whether preschool-aged children's limitations in affective EFT may be one reason for their problems in initiating proactive behavior remains an open question addressed by the current study.

Current Study

The aim of the current study was threefold. First, we wanted to test whether proactive behavior can be fostered by mentally guiding preschool-aged children through an upcoming episode and by triggering them to imagine how they would feel subsequently (affective EFT). We focused on 5-year-old children, as previous research has shown that children are already showing at least rudimentary forms of EFT, but still struggle with initiating proactive behavior (e.g., Atance & Meltzoff, 2005; Brinums et al., 2018). Guiding children to envision future affective states might help them to overcome those limitations. We contrasted three conditions: positive, affective EFT (anticipation of possible positive outcomes and associated positive affect), negative, affective EFT (anticipation of possible negative outcomes and associated negative affect), and control group (no instructions to imagine the future episode). Considering positive as well as negative affective EFT based on the theoretical assumption and empirical findings that motivation can result from promoting as well as from preventing consequences of an event (e.g., Bandura, 1982; Elliot et al., 2013; P. M. Gollwitzer, 1999; Higgins, 1998; Lang, 1995; Vasquez & Buehler, 2007). We hypothesized that children would behave more proactively in the positive and in the negative affective EFT condition compared to the control group, based on the findings on affective EFT in adult research (e.g., Ji et al., 2021).

Second, we aimed at exploring the theory-driven mechanisms of this possible link. Based on the model of goal-directed behavior (Perugini & Bagozzi, 2001), we were interested in whether affective EFT would increase children's motivation to master the upcoming episode. Drawing on the construal level theory (e.g., Trope & Liberman, 2010), we investigated whether children receiving guidance in affective EFT would perceive the upcoming event to be less distant psychologically. Specifically, we explored whether children would perceive the upcoming event to be temporally closer, to be more plausible, and whether they would perceive their future self to be closer to their current future self. The level construal theory proposes that compared to more abstract representations of an event, more concrete event representation (e.g., in terms of more detailed episodic thoughts) goes along with a lower level of psychological distance to that event. Indeed, adults usually perceive events as more plausible and as temporally closer if they imagine them in more episodic detail (Abram et al., 2014; Addis et al., 2007; Hallford et al., 2022). Further, participants receiving a training in episodic specificity engage more in active coping behaviors compared to a control condition (Jing et al., 2016). Another approach to promote future-oriented behavior was reviewed by Hershfield and Bartels (2018): participants feel closer to their future self after more vividly imagining their future self (e.g., by age-rendered photos of the participants, by instructing them to write a letter to the future self), leading to decisions that are healthier, more economic and more in line with moral standards in the long-run (see also Urminsky, 2017 for a review). Finally, we also explored whether affective EFT would impact children's proactive behavior by changing their current affect.

We did so to pay tribute to the findings of a recent meta-analysis (Schubert et al., 2020) and the rich research on the interplay between cognition and emotion (e.g., Lerner et al., 2015; Worthy et al., 2014).

Third, given the somewhat contradictory findings in adults, we aimed to identify individual factors (moderators) that would explain why some children may benefit more from guided affective EFT than other children. We considered children's ability to episodically think about the future in everyday life, arguing that children who possess lower prospective abilities may benefit more from guided affective EFT. We also explored the role of individual differences in two motivational systems: the behavioral inhibition system and the behavioral activation system (Gray, 1970). According to the reinforcement sensitivity theory (Gray, 1970), the behavioral inhibition system (BIS) responds to novel, potentially aversive, or punitive stimuli. Activation of the BIS results in the inhibition of approaching a goal to avoid harm. Thus, individuals with higher BIS sensitivity have the tendency to act on avoidance or prevention goals, that is, they tend to be more motivated to act future-oriented when imagining potentially upcoming harm (e.g., failing an upcoming test). In turn, the behavioral activation system (BAS) responds to rewarding and nonpunishing stimuli. Activation of the BAS leads to engagement in approaching a goal to maximize reward. Thus, individuals with higher BAS sensitivity have the tendency to act on approach or promotion goals, that is, they should be more motivated to act future-oriented when imagining potential upcoming rewards (e.g., passing an upcoming test). Accordingly, the literature suggests that proactive behavior is most likely when an individual's disposition and motivational framing correspond (Ludolph & Schulz, 2015; Motyka et al., 2014).

Method

Participants and Design

The study was preregistered before the data collection (AsPredicted 70994). The final sample comprised $N = 90$ children. We conducted a priori power analysis for the planned logistic regression addressing the main hypothesis (group differences in proactive behavior depending on condition). A priori power analysis using G-Power 3.1.9.4 revealed that $N = 90$ would be sufficient to detect moderate-to-large group differences ($f = 0.3$), given an alpha level of .05 and a statistical power of 0.80. Children were randomly assigned to one of three conditions varying with regard to affective EFT: (a) thinking about a positive outcome and associated feelings, (b) thinking about a negative outcome and associated feelings, and (c) control condition. Data collection took place between October 1, 2021, and September 1, 2022. Additional data sets of $n = 21$ children were removed from the final analyses. Reasons for the exclusion were deviations of the experimenter from the manual ($n = 10$), interruption of the experimental procedure for more than 2 min during or after the manipulation ($n = 4$), technical problems ($n = 3$), parental intervention ($n = 2$), or children who refused to continue ($n = 2$). Children in the final sample were between 60 and 71 months of age ($M = 5.43$ years, $SD = 3.49$ years, 43 female). All participating children were German citizens and 80.4% of the parents held a general university entrance qualification or a higher qualification. Participants were recruited from a database of families who expressed general interest in taking part in developmental studies at the Department of Clinical Child and Adolescent Psychology at Ruhr-Universität Bochum. Children received stickers and a certificate of participation at the end of the experiment.

Materials and Procedure

Hypotheses were tested in an online version of the two-room paradigm (Suddendorf & Busby, 2005). Deliberate practice served as an indicator of proactive behavior (Brinums et al., 2018; Davis et al., 2016). The testing session took place as a video conference via Zoom (Version 5.11.1) and was recorded using Open Broadcaster Software (27.0.1). Each child took part in one exclusive session with one of her/his caregivers. The session lasted for about 40 min. We decided for an online format as this allowed us to continue data collection independent of restrictions due to the COVID-19 pandemic. During the experimental procedure, all stimuli were presented on a laptop computer using Microsoft PowerPoint software by the experimenter, who shared the screen. Within a virtual adaptation of the two-room task (e.g., Suddendorf & Busby, 2005, see also Redshaw & Suddendorf, 2013), we assessed proactive behavior (in terms of deliberate practice) after the manipulation took place: guided affective EFT about positive outcome, guided affective EFT about negative outcome or control condition. Parents filled in several online questionnaires before and during the testing session.

Warm-Up, Training, and Introduction

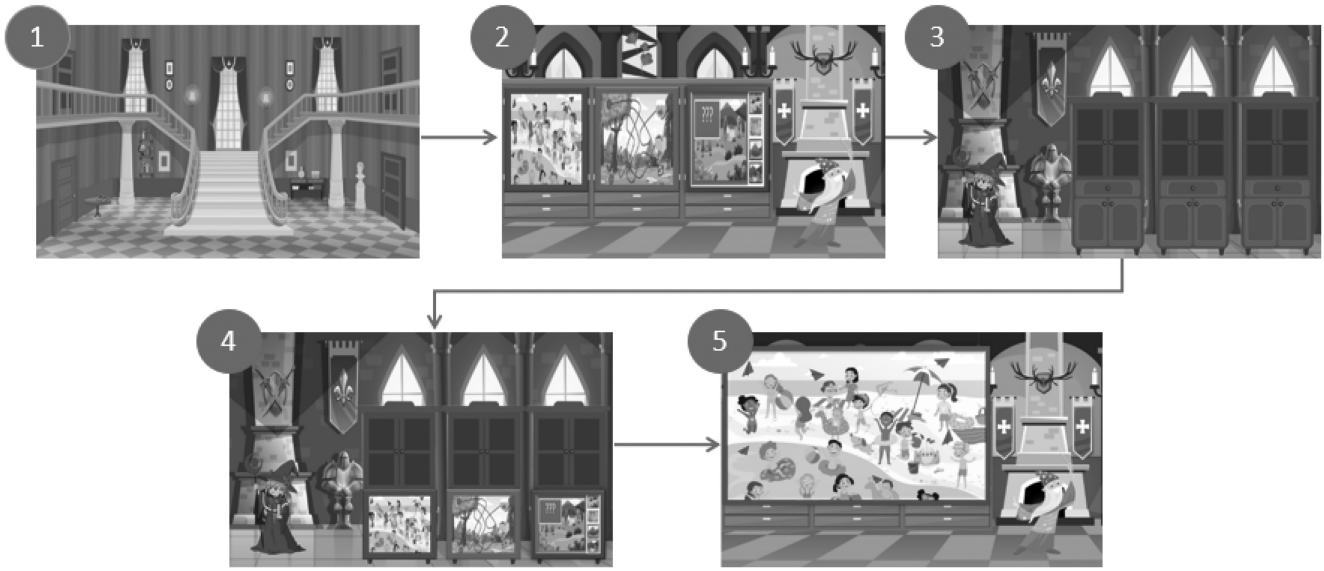
After a short warm-up, the experimenter started the Microsoft PowerPoint presentation and shared her/his screen. Before the start of the two-room task, children received a training for rating the valence and arousal of their affective states on a 5-point Likert scale (adapted from Bradley & Lang, 1994; McCormack et al., 2019). During the training, the experimenter described four situations that are typically linked to different affective states (e.g., "It's your birthday"). Children were asked to rate how they would feel (valence) and how aroused they would be during those situations (arousal). The training aimed at reducing preschool children's tendency to choose extreme points of a scale. Finally, children rated their current valence and arousal (valence and arousal before manipulation).

Afterward, the virtual two-room task started with a picture of a castle. The experimenter and children virtually entered the hall of the castle and encountered two doors of two rooms mirroring the spatial setup of the laboratory version of the two-room task. Children first visited Room A (presentation of the problem) and then visited Room B (manipulation of affective EFT, opportunity to prepare for the problem). Rooms differed with respect to the color of the doors and rooms (red or blue) and the inhabitant (either a sorceress called Merline or a wizard called Krabat). The identity of Rooms A and B was counterbalanced across participants (either red or blue and either Merline as the inhabitant or Krabat). Figure 1 presents all steps of the procedure in chronological order.

Presentation of the Upcoming Problem

In Room A, children learned about three different games (see Figure 1). In the path game, children had to find the right way to the jar with the goldfish. In the paper airplane game, children had to count the paper airplanes in the picture. In the puzzle game, children had to identify the missing piece of the puzzle. All three games were presented in the same way and followed the same procedure. First, the inhabitant of the room explained the game, whereupon the experimenter revealed the solution of the first training trial.

Figure 1
Procedure of the Experiment



Note. 1 = Hall of the castle with Room A (left) and Room B (right); 2 = Room A with inhabitant Krabat the wizard; introduction to three different games (left to right: paper airplane game, path game, puzzle game) and announcement of the test in one of the games later on (upcoming problem); 3 = Room B with inhabitant Merline the sorceress; manipulation of affective EFT according to one of three conditions; 4 = measuring deliberate practice: children can decide freely, which of the three games they want to play first; 5 = Room A with the test and the opportunity to win stickers. EFT = episodic future thinking. Images adapted with permission from shutterstock.com, by Mentalmind, n.d., https://www.shutterstock.com/de/image-vector/find-10-objects-picture-puzzle-hidden-1879888396; from shutterstock.com, by Microstocker.Pro., n.d., https://www.shutterstock.com/de/image-vector/cartoon-castle-background-fireplace-knights-empty-1157668711; from shutterstock.com, by Net Vector, n.d., https://www.shutterstock.com/de/image-vector/old-caucasian-white-magician-hat-long-1028538943; from shutterstock.com, by VectorPlotnikoff, n.d., https://www.shutterstock.com/de/image-vector/open-closet-wardrobe-isolated-on-white-1140999938; from shutterstock.com, by Vectorpocket, n.d., https://www.shutterstock.com/de/image-vector/vector-castle-hall-interior-royal-ballroom-1096514759; from shutterstock.com, by YUCALORA, n.d., https://www.shutterstock.com/de/image-vector/vector-old-hall-room-stairs-doors-1525737074; from wikipedia.org by Kasuga, n.d., https://commons.wikimedia.org/wiki/File:Wikipe-tan_sorceress_color.svg; from shutterstock.com, by Freepik, (n.d.), https://www.freepik.com/free-vector/hand-drawn-spring-landscape_12556356.htm.

Afterward, children were told that trials vary in difficulty from very easy trials to very difficult trials. Then, the experimenter presented a second training trial as an example of an easy trial and a third training trial as an example of a difficult trial. Children had 10 s to solve each trial before the respective picture diminished. If a child failed, the experimenter explained the correct solution.

After introducing all three games, the experimenter announced that the children would leave Room A now to visit Room B, but that they would come back to Room A later. Children were informed in which of the three games a test would take place (target game). The experimenter explained that the test would comprise 10 trials and that children would receive a sticker for each trial they solved correctly. For illustration, the experimenter presented two collection slides. One collection sheet contained a few stickers (two) indicating the outcome after a bad performance. The other collection sheet contained a lot of stickers (nine) indicating the outcome after a good performance. To further ensure that children comprehended the procedure, the experimenter asked children to repeat the next steps and provided respective information once again if children did not answer correctly. Before leaving Room A, the experimenter referred to a real-life 20-min hourglass next to her/him and explained that the child would return to Room A after all the sand would have left the upper bulb. The hourglass remained in sight of the laptop camera at all times.

Delay and Manipulation of Affective EFT

Back in the hall of the castle, children completed the passive vocabulary subtest of the German version of the Wechsler's Preschool and Primary Scale of Intelligence-III (Hannover-Wechsler-Intelligenztest für das Vorschulalter-III; Fritz-Stratmann et al., 2007) implementing a delay of 5 min (Davis et al., 2016). In this test, the children had to indicate which of the four pictures showed the object that the experimenter asked for. After 5 min, the experimenter and the child entered Room B and children received instructions depending on their assignment of one of the three conditions. In the two experimental conditions (positive outcome and affect, negative outcome and affect), the experimenter asked children to imagine how the upcoming test would unfold and how they would feel. The experimenter guided children mentally through three exemplary trials in the respective target game. In the positive outcome condition, the experimenter described how positively the child would feel after solving three trials and winning many stickers at the end. The structure of the scenario was equal in the negative condition but only differed with respect to the valence of the outcome and the ascribed affect. Thus, the experimenter described how badly children would feel while failing in the three trials and winning very few stickers at the end. In the control condition, the experimenter only repeated the next steps of the procedure (return to Room A and test in the target game).

Proactive Behavior and Possible Mediators

After the experimental manipulations, children of all groups were asked to evaluate how detailed they could imagine the upcoming test (detailedness; McCormack et al., 2019); how well they could imagine the associated feelings (emotional clarity); how many stickers they would like to win in the test (motivation); how many stickers they think they would actually win in the test (plausibility; B. A. Kaplan et al., 2016); how similar their present and future self would be (connectedness to future self; Urminsky, 2017); and how far away the test felt in time (perceived temporal distance, D'Argembeau & Van Der Linden, 2004) on illustrated 3-point Likert rating scales. In addition, children of all groups answered two questions about how they currently felt (valence and arousal after manipulation; McCormack et al., 2019) on a 5-point Likert scale.

Afterward, the experimenter referred to the hourglass and told the child "Look, the sand has nearly passed through, soon we will be going back to Merline/Krabat in the red/blue room." Subsequently, the inhabitant of Room B revealed the same three games of Room A. The inhabitant pretended to be tired and offered children the opportunity that they could play whatever game they wanted while the inhabitant would take a nap. Children were further told that they could play a maximum of 10 trials, that they could switch between the games, and that they could stop playing at any time. Afterward, the inhabitant of Room B fell asleep. Then, the experimenter asked the child "Which game do you choose?." At no point, the word "practice" or the upcoming test was mentioned. After the children finished playing, they were asked "Which game did you play first?" and "Why did you play this game?." Lastly, children's understanding of deliberate practice was tested with the following questions: "What is practicing?," "What do you do when you practice?," "What can you do to get better at something?" (see Brinums et al., 2018). Thereafter, the children were made aware that the hourglass had almost run out and that it was time to go back to Room A. There, the test took place. The experimenter provided help if necessary so that each child won a full sticker sheet at the end of the experiment.

Scoring

All videos were scored by one coder who was blind to the hypotheses; 49% of randomly selected videos were also scored by a second coder. Deliberate practice was credited when children chose the target game first (Brinums et al., 2018; Davis et al., 2016). In addition, the time the children played each game was measured. Children's reasons for choosing the game were credited with one point if their answer referred to deliberate practice (e.g., "to be better in the test later"), but they received zero points for all other reasons given (e.g., "because it is the easiest one"). With respect to the understanding of deliberate practice, children received one point if their answer indicated that practicing involves repetition (e.g., "do something over and over again until you can do it") and that practice, repetition, or perseverance is needed to get better in something (Brinums et al., 2018). Using Cohen's κ statistic, interrater reliability for deliberate practice, reasons for choosing the game, and the understanding of deliberate practice showed nearly perfect agreement between coders (Ks $> .97$).

Moderators

In advance and during the testing session parents answered several online questionnaires to assess the moderating variables. Parents completed the Carver and White BIS/BAS scales (Carver & White, 1994; Vervoort et al., 2015) to measure children's behavioral inhibition (BIS; e.g., "My child is very fearful compared to his/her friends.") and their behavioral activation (BAS; e.g., "My child craves for excitement and new sensations."). Higher scores on the BIS scale indicate higher dispositional levels of behavioral inhibition, more frequent avoidance behavior, and higher levels of negative affectivity. On the BAS scale, higher scores indicate higher dispositional levels of impulsivity, more frequent approach behavior, and higher levels of positive affectivity. Mean scores were calculated for the seven BIS items and the 13 BAS items (4-point Likert scales). Further, parents completed the children's future thinking questionnaire (CFTQ; Mazachowsky & Mahy, 2020). For this study, we calculated the mean score from the nine items of the Episodic Foresight subscale (6-point Likert scales) as an indicator of children's ability to episodically think about the future in everyday life. For the Episodic Foresight subscale, parents rated children's ability to project themselves mentally into the future (e.g., "[My child] Understands that he or she may be hungry later even though he or she has just eaten a large meal"). All three scales indicated acceptable internal consistency, Cronbach's α .681–.755 (George & Mallery, 2021).

Results

Preliminary Analyses

A one-factor analysis of variance (ANOVA) showed that groups were comparable with regard to age, $F(2, 87) = 0.08$, $p = .928$. χ^2 tests revealed that gender distributions did not differ significantly between the conditions, $\chi^2(2, N = 90) = 1.43$, $p = .490$), as well as the understanding the meaning of practicing $\chi^2(2, N = 89) = 1.54$, $p = .464$). Due to nonnormal distribution, Kruskal–Wallis tests were conducted to compare groups with respect to valence, arousal before the manipulation, and passive vocabulary. No group differences emerged, neither for valence before the manipulation, $H(2) = 3.93$, $p = .140$, for arousal before manipulation, $H(2) = 3.93$, $p = .140$, nor passive vocabulary, $H(2) = 2.88$, $p = .237$. Table 1 shows descriptive statistics for all variables.

Deliberate Practice

A binary logistic regression was conducted to examine the influence of affective EFT conditions on the likelihood of children selecting the target game. For the negative condition relative to the control condition, the log odds coefficient was $B = 1.14$, $SE = 0.55$, Wald $\chi^2(1) = 4.30$, $p = .038$, indicating a significant increase in the likelihood of choosing the target game. Conversely, for the positive condition compared to the control, the log odds were not statistically significant, $B = 0.60$, $SE = 0.56$, Wald $\chi^2(1) = 1.18$, $p = .276$. The odds ratios revealed that the odds of selecting the target game first were 3.14 times higher, 95% CI [1.06, 9.27], in the negative condition and 1.83 times higher, 95% CI [0.61, 5.45], in the positive condition relative to the control condition. Binomial tests further showed that children in the negative condition chose the target game more often than expected by chance (.33; binomial $p = .017$), whereas children in the positive outcome condition and children in the control group did not (ps $\geq .263$; Figure 2). All children spent all 10 trials with the game which they had chosen first. Thus, we refrained from analyzing how much time children spent playing the target game as a second indicator for deliberate practice. Among those children who played the target game first (36%), a small minority reported to play it to practice (28%). However, none of the children

Table 1
Descriptive Statistics for Preliminary Analyses by Group Status

Variables	Affective EFT		
	Control	Positive outcome	Negative outcome
1. Age (in months)	$M = 65.00$	$M = 65.33$	$M = 65.07$
	$SD = 3.50$	$SD = 3.58$	$SD = 3.50$
2. Gender (female)	43% ($n = 13$)	57% ($n = 17$)	43% ($n = 13$)
3. Understanding practice	27% ($n = 8$)	40% ($n = 12$)	27% ($n = 8$)
4. Prevalence[a]	$M = 4.69$	$M = 4.40$	$M = 4.50$
	$SD = 0.66$	$SD = 0.72$	$SD = 0.63$
5. Prearousal[a]	$M = 3.23$	$M = 3.90$	$M = 4.00$
	$SD = 1.61$	$SD = 1.37$	$SD = 1.28$
6. Passive vocabulary	$M = 18.50$	$M = 18.20$	$M = 17.67$
	$SD = 2.40$	$SD = 2.12$	$SD = 2.05$

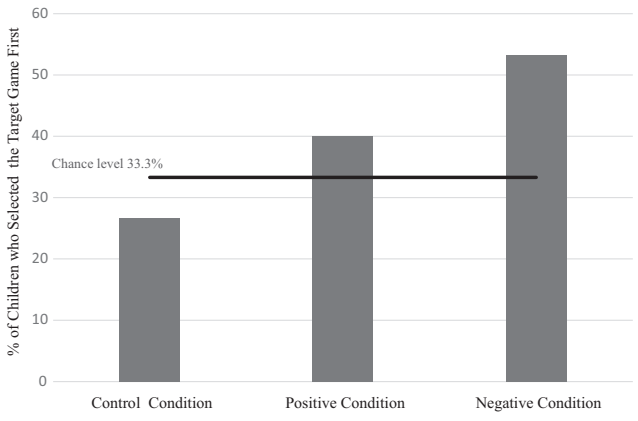
Note. All reported information per group status refer to $N = 30$. EFT = episodic future thinking.
[a] Five-point Likert scales.

who selected another game than the target game explained her/his choice with the intention to "practice." An equal number of children across groups justified their game choice with practicing, as χ^2 test showed, $\chi^2(2, N = 90) = 0.67$, $p = .713$, Cramer's $V = 0.08$.

Mediators and Moderators

Looking for factors that could explain how affective EFT influences children's decision to deliberately practice, we further explored possible group differences in the detailedness and emotional clarity of children's future simulations, children's motivation to win, perceived plausibility of winning, temporal distance to the test, connectedness to the future self and change in affect (valence and arousal pre–post manipulation; Table 2). Independent one-way ANOVAs revealed no group differences for valence after the manipulation, $F(2, 87) = 0.69$, $p = .143$, $\eta^2 < .01$; change in valence, difference between pre–post, $F(2, 87) = 0.03$, $p = .973$, $\eta^2 < .01$; change in arousal, difference between pre–post, $F(2, 87) = 0.1$, $p = .910$, $\eta^2 = .00$; temporal distance, $F(2, 86) = 2.35$, $p = .101$, $\eta^2 < .01$; and connectedness to the future self, $F(2, 80) = 0.89$, $p = .414$, $\eta^2 = .02$. As the requirements of variance homogeneity were not met, a more robust Welch-ANOVA was conducted (Moder, 2010), indicating no significant differences between groups for detailedness, $F(2, 87) = 0.69$, $p = .505$, $\eta^2 = .02$, plausibility of winning, $F(2, 86) = 1.35$, $p = .265$, $\eta^2 = .03$, or arousal after the manipulation, $F(2, 87) = 3.02$, $p = .054$, $\eta^2 = .06$. Due to the lack of variance, we did not test for group differences respecting children's motivation to win: except for one child, all other children chose the highest possible rating to describe their motivation. A post hoc sensitivity analysis for the conducted ANOVAs in G*Power revealed that the present sample size of $N = 90$ participants was sufficient to find moderate-to-large effects of condition ($f \geq 0.333$; Cohen, 1988) on the subjective ratings of valence, arousal, detailedness, emotional clarity, motivation to win, plausibility of winning, and connectedness to future self. Temporal distance gave an alpha level of .05 and a statistical power of 80%.

Figure 2
Percentage of Children Who Selected the Target Game First Depending on Condition



Note. The bold horizontal line indicates the chance level of choosing the target game first (33.3%).

We further explored whether scores on the BIS/BAS scale and the CFTQ moderated the effect of affective EFT on deliberate practice. However, in three logistic regression analyses no interaction emerged between condition and the BIS, $B = -0.12$, $SE = 2.06$, Wald $\chi^2(1) = .003$, $p = .953$, $\text{Exp}(B) = 0.88$, 95% CI [0.01, 50.57], nor did we find an interaction between condition and the BAS scales, $B = -3.07$, $SE = 2.74$, Wald $\chi^2(1) = 1.24$, $p = .264$, $\text{Exp}(B) = 0.04$, 95% CI [0.00, 10.12]. Further, no interaction between condition and the EFT subscale of the CFTQ emerged, $B = -0.93$, $SE = 1.88$, Wald $\chi^2(1) = .24$, $p = .622$, $\text{Exp}(B) = 0.39$, 95% CI [0.01, 16.00]. Thus, children were equally influenced by the manipulation of affective EFT independent of their dispositional level of behavioral inhibition, behavioral activation, and their EFT skills according to parent report.

A post hoc sensitivity analysis revealed that the given sample size was sufficient to find moderate-to-large interaction effects of condition by CFTQ or condition by BIS/BAS ($f \geq 0.419$; Cohen, 1988) on proactivity given an α level of .05 and a statistical power of 80%. G*Power does not provide a direct possibility to analyze sensitivity when testing for interaction effects in logistic regressions. Thus, we used the parallel setup for continuous outcome variables (analyses of covariance, F test). MacCallum et al. (2002) showed that analyses with dichotomous variables require about 36% smaller samples to achieve the same statistical power that would be found for continuous variables. Thus, we calculated with an N of 58 (original sample minus 36%) instead of $N = 90$.

Table 2
Descriptive Statistics for the Possible Mediators and Moderators

Mediators and Moderators	Control	Affective EFT	
		Positive	Negative
Mediators			
1. Postvalence[a]	$M = 4.30$; $SD = 0.98$ ($N = 30$)	$M = 4.20$; $SD = 1.15$ ($N = 30$)	$M = 4.33$; $SD = 0.84$ ($N = 30$)
2. Postarousal[a]	$M = 3.47$; $SD = 1.68$ ($N = 30$)	$M = 4.13$; $SD = 1.33$ ($N = 30$)	$M = 4.27$; $SD = 0.94$ ($N = 30$)
3. Detailedness[b]	$M = 1.90$; $SD = 0.96$ ($N = 30$)	$M = 2.17$; $SD = 0.79$ ($N = 30$)	$M = 2.07$; $SD = 0.90$ ($N = 30$)
4. Emotional clarity[b]	$M = 1.90$; $SD = 0.90$ ($N = 29$)	$M = 2.27$; $SD = 0.82$ ($N = 30$)	$M = 2.10$; $SD = 0.90$ ($N = 29$)
5. Motivation to win[b]	$M = 2.93$; $SD = 0.25$ ($N = 30$)	$M = 3.00$; $SD = 0.00$ ($N = 30$)	$M = 3.00$; $SD = 0.00$ ($N = 30$)
6. Plausibility of winning[b]	$M = 2.53$; $SD = 0.68$ ($N = 30$)	$M = 2.77$; $SD = 0.43$ ($N = 30$)	$M = 2.69$; $SD = 0.54$ ($N = 29$)
7. Connectedness to the future self[b]	$M = 2.21$; $SD = 0.68$ ($N = 29$)	$M = 2.21$; $SD = 0.68$ ($N = 29$)	$M = 2.15$; $SD = 0.78$ ($N = 26$)
8. Temporal distance[b]	$M = 2.43$; $SD = 0.73$ ($N = 30$)	$M = 2.37$; $SD = 0.81$ ($N = 30$)	$M = 2.00$; $SD = 0.93$ ($N = 29$)
Moderators			
9. BIS[c]	$M = 2.56$; $SD = 0.37$ ($N = 30$)	$M = 2.61$; $SD = 0.33$ ($N = 30$)	$M = 2.62$; $SD = 0.41$ ($N = 26$)
10. BAS[c]	$M = 3.12$; $SD = 0.36$ ($N = 30$)	$M = 3.16$; $SD = 0.31$ ($N = 30$)	$M = 3.20$; $SD = 0.33$ ($N = 26$)
11. Episodic foresight (CFTQ)[d]	$M = 3.78$; $SD = 0.72$ ($N = 25$)	$M = 3.68$; $SD = 0.52$ ($N = 26$)	$M = 4.01$; $SD = 0.61$ ($N = 22$)

Note. Not all parents reported all information. *N* refers to the number of participants we received data from. EFT = episodic future thinking, BIS = behavioral inhibition system, BAS = behavioral activation system, CFTQ = children's future thinking questionnaire.
[a] Five-point Likert scale. [b] Three-point Likert scale. [c] Four-point Likert scale. [d] Six-point Likert scale.

Discussion

The current study investigated whether and what type of affective EFT (positive or negative) can help 5-year-old children to behave more proactively, and which factors may explain and moderate this possible influence. In accordance with our hypothesis, preschoolers behaved more proactively compared to the control group, that is, they deliberately practiced for an upcoming test above chance level and significantly more often if they were guided to imagine a negative outcome with the respective negative affect. The effect of negative affective EFT could not be explained by group differences in the theory-driven mechanisms, that is, children in all groups reported similar levels of motivation, perceived psychological distance to the upcoming episode (plausibility, temporal distance, connectedness to the future self), and there were no changes in children's affect in any of the groups. Similarly, groups did not differ in subjective detailedness and emotional clarity of children's mental simulations of the future. No effect of affective EFT was found for children who were guided to imagine a positive outcome with respective positive affect compared to a control group. This finding remained even after considering individual differences in behavioral inhibition, behavioral activation, and children's ability to episodically think about the future in everyday life.

To our knowledge, the current study is the first to show that affective EFT can elicit self-initiated proactive behavior already in preschool-aged children. This corroborates with general theoretical models that assume a functional role of anticipated affect in goal-directed behavior (Bagozzi et al., 2003). In addition, our results extend empirical adult research, showing that imagining upcoming emotions promotes far-sighted decisions and intensive engagement in goal-directed behavior (Ji et al., 2021; S. Kaplan et al., 2020; Renner et al., 2019; Richard et al., 1996). The present findings suggest that difficulties in affective EFT may be one reason why children rarely show proactive behavior before school age (Atance & Meltzoff, 2005; Mahy et al., 2014; Martin-Ordas & Atance, 2021). In line with this idea, we demonstrated that preschool children prepared for the future only after they were encouraged to imagine negative affective consequences. Accordingly, our results complement heterogeneous findings that more EFT without a focus on anticipated affect facilitates future-oriented behavior, such as prospective memory and delay of gratification in children (Altgassen et al., 2017; Burns et al., 2021; Chernyak et al., 2017: Kretschmer-Trendowicz et al., 2019; Leech et al., 2019). This underlines the critical role of the affective-motivational component of EFT.

In the current study, only imagining the negative outcome was effective, whereas the mental simulation of the positive outcome showed no effect. This finding contrasts with theoretical frameworks suggesting that negative as well as positive anticipated affect can motivate one's behavior (Elliot et al., 2013; see also Bandura, 1982; Elliot, 1999; P. M. Gollwitzer, 1999; Higgins, 1998; Schubert et al., 2020). It also contradicts empirical findings showing that anticipated pleasure enhances behavioral intentions and increases engagement in imagined everyday activities (Ji et al., 2021; Renner et al., 2019). However, our results line up with previous empirical studies that found no beneficial influence of positive future thoughts or even found a negative effect (Kappes et al., 2012; Oettingen & Wadden, 1991; Pham & Taylor, 1999). In those studies, as in the present one, positive future-related thoughts (e.g., passing a test) focused on a desired outcome. Such outcome-related thoughts usually did not contain information on how to achieve a positive outcome or address the obstacles that participants had to overcome. Thus, such positive outcome simulations have been suggested to prevent people from planning and initiating concrete goal-related actions. In contrast, process simulation (i.e., imagining how to practice for the test) or mental contrasting (i.e., anticipating obstacles) have been suggested to be more effective for goal accomplishment in adults (e.g., Martin & Hall, 1995; Oettingen, 2012; Pham & Taylor, 1999). Therefore, one promising avenue for future studies may be to test the facilitating effect of positive affective EFT in combination with mental contrasting in preschool-age children (e.g., A. Gollwitzer et al., 2011; for example with elementary school children).

Another explanation for the present findings comes from literature reporting about self-overestimation in young children (e.g., Lipko et al., 2009; Piehlmaier, 2020). Children up to the age of seven overestimate their competencies and performance in managing upcoming challenges (Schneider, 1998; Shin et al., 2007; Xia et al., 2023; Yussen & Levy, 1975). Younger children with a rosy future in

their minds might be harder to manipulate; prompts to imagine a positive future may be less effective to promote proactive behavior compared to older children. This is in line with an assumption made by Oettingen and Reininger (2016), who argue that an overoptimistic view alone does not help us to prepare for challenging tasks. In contrast, children in the negative condition may have formed a more realistic view on their future performance. However, we found no evidence for this idea, as children in all groups perceived an equally high plausibility of winning after the manipulation. Still, the positive vision of the future may have mapped on to children's default motivational state in our study (high likelihood of winning many stickers). In contrast, the negative preview of an undesired future may have contrasted with children's initial motivational state leading to behavior adaption.

Further, it is possible that children overestimated their negative affect in response to imagining the negative outcome, but did not overestimate the positive affect in response to imaging the positive outcome. A respective negative intensity bias has been shown for affective forecasts of preschool-aged children as well as adults (Gautam et al., 2017; Kopp et al., 2017). In theory, it has been argued that this kind of negative impact bias helps us to foster avoidance motivation, and thus, to prevent harm and to benefit survival at the end (Gilbert & Wilson, 2007; Wilson & Gilbert, 2003). Hence, children in the negative condition may have shown a higher motivation (to prevent a low test performance) compared to the motivation of children in the positive condition (to reach a high test performance). Arguing somewhat against this hypothesis, children of all groups expressed an equally high motivation to win stickers during the test. However, this question did not explicitly differentiate between approach and avoidance motivation. So, future studies should, as an example, ask children about their motivation to prevent future failure versus their motivation to achieve to gain success. Further, trait regulatory focus (promotion or prevention) did not moderate the impact of affective EFT, that is, even children with higher behavioral activation (BAS) did not benefit more from the positive condition compared to children with lower levels of behavioral activation. This contradicts the idea that regulatory fit boosts goal-directed behavior (Files et al., 2019). However, before drawing conclusions about the moderating role of both motivational systems, future studies have to replicate the present findings using behavioral measures of BIS and BAS in addition to parent report.

Overall, our results seem to contradict the findings reported by Brinums et al. (2023) at first glance. However, Brinums et al. (2023, Experiment 1) found an effect of prompting positive affective EFT only for children aged 8 years and 9 years, but not for children aged 6 and 7 years. Thus, they did not find an effect of prompting positive EFT for the age group that was most similar to our sample. In contrast to Brinums et al.'s (2023) suggestion, the absence of an effect for younger children cannot only be explained by younger children's tendency to rely on scripts rather than preexperiencing how they will feel. In our study, even offering children a ready-made detailed simulation did not facilitate proactivity. Rather, our results suggest that positive affective EFT seems not to increase preschool-aged children's attempts to prepare for the future. Thus, bringing together Brinums et al.'s (2023, Experiment 1) findings and the findings of the current study, 8 to 9-year-old children may benefit from different strategies than preschoolers and 6 to 7-year-old children. This developmental pattern may be explained by the developmental differences in self-overestimation (as described above), for example. However, when the experimenter in Brinums et al. (2023, Experiment 2) prompted children to imagine upcoming success using definitive language (Experiment 2) instead of conditional language (Experiment 1) in a follow-up experiment, 8 to 9-year-olds in the experimental group did not practice more than children in the neutral condition anymore. Brinums et al. (2023) discuss that older children (aged 8–9 years) in Experiment 1 may have anticipated possible failure and respective negative feelings after being prompted with instructions that contained conditional if statements. Thus, different age groups may not benefit from different strategies, but avoidance or prevention goals may be in general more powerful in eliciting future-oriented behavior in children. This idea would nicely dovetail with our finding that negative affective EFT facilitates deliberate practice. To disentangle these two possible interpretations, future studies are needed that encompass a wider age spectrum and that manipulate positive as well as negative affective EFT within one task setup.

Overall, the theory-driven mechanisms derived from adult literature could not explain the presence of an effect of affective EFT or the absence of it (positive condition) in this study. Beyond motivation, groups also did not differ in the psychological distance (plausibility, temporal distance, connectedness to the future self), in children's affect, the detailedness, or the emotional clarity of their future simulation. These findings are unexpected, as anticipated positive events typically are perceived as temporally closer and as more vivid compared to negative events (D'Argembeau & van der Linden, 2004). To some extent, measurement issues may have covered group differences such as children's tendency to provide extremely positive ratings with respect to their own affect even after a respective training (see McCormack et al., 2019 describing a similar problem). In this context, future studies would benefit from using additional assessment methods such as physiological measures instead of subjective ratings (e.g., assessment of heart rate; for a review see Kranjec et al., 2014), questions respecting discrete emotions (instead of dichotomous affect; Harmon-Jones et al., 2017), and more indirect measures instead of explicit ratings of detailedness and temporal distance (e.g., assessing reaction times or embodied measures; e.g., Burns et al., 2021). Beyond methodological challenges, the investigation of anticipated discrete emotions (e.g., anticipated regret; Croy et al., 2015) may also provide one avenue for a more fine-grained exploration of the mechanisms in children (e.g., the negative preview may have evoked anticipated regret or anticipated sadness). In adults, several studies document a strong impact of anticipated regret on health-related intentions and subsequent behavior (for a meta-analysis see Brewer et al., 2016). Further, some work revealed a critical role of anticipated sadness (see Sette et al., 2018 for a positive influence on prosocial behavior).

Limiting the generalizability of this research, 80.4% of the participating children's parents held a general university entrance qualification or a higher qualification and all grew up in a Western, educated, industrial, rich, democratic society (WEIRD). Socioeconomic background and culture have been acknowledged as sources of interindividual differences in future-oriented cognition (e.g., Haushofer & Fehr, 2014; Kappes et al., 2012). Thus, they may also influence the way how affective EFT influences proactive behavior. For example, children coming from a lower socioeconomic background may particularly benefit from external support of affective EFT, as provided in the present study. This seems likely as individuals growing up in families with limited resources make less future-oriented decisions without external help and show a more protracted development of episodic memory compared to individuals who live in households with more resources (e.g., Botdorf et al., 2022; Delgado et al.,

2022). Further, cultural differences have been reported with respect to the specificity and role of the self in episodic processes and regarding how goal-oriented behavior can be motivated (Oettingen et al., 2008; Wang, 2021), to name a few of the manifold differences relevant for the link between affective EFT and proactivity. For example, Wang (2021) reviews that children from East Asian cultures generate less detailed memories and future thoughts about events compared to children in Western cultures. Thus, children from East Asian cultures may benefit more from guidance through a detailed mental simulation of a future event. In turn, significant others and social relations play a more critical role for individuals from East Asian cultures with respect to foreseeing events (Wang, 2021) and pursuing goals (Oettingen et al., 2008) compared to individuals from Western cultures. From this perspective, children from East Asian cultures may benefit less from the manipulation used in our study current manipulation as it emphasizes children's own perspective without being socially embedded. Accordingly, cross-cultural research including children from more diverse backgrounds is urgently needed to clarify whether the observed influence of affective EFT on proactivity proves to be universal or turns out to be rather specific for children living in well-suited families of WEIRD societies.

Conclusion

The present work is one of the first few studies focusing on the affective-motivational component of EFT and its beneficial role in young children's proactive behavior. It thereby extends mixed evidence showing that EFT can increase some type of future-oriented behavior (e.g., prospective memory; Altgassen et al., 2015), but not other forms (e.g., delay of gratification; Burns et al., 2021). In addition, our results complement research showing that a future-oriented mindset can facilitate some type of future-oriented behavior (i.e., planning and prospective memory), but not proactive behavior (Chernyak et al., 2017). The affective-motivational component of EFT was shown to be an effective tool for fostering future-oriented behavior already in young children. These findings provide manifold implications for further research on the interplay between the typical and atypical development of affective EFT and proactive behavior in early childhood. Our results also open new avenues for applications in the pedagogical as well as clinical settings.

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Received May 24, 2023
Revision received November 3, 2023
Accepted December 5, 2023 ■