Received: 8 November 2022 | Revised: 19 September 2023 | Accepted: 21 September 2023

DOI: 10.1002/bdm.2358

RESEARCH ARTICLE

WILEY

Future–present relationship insensitivity: A new perspective on psychological myopia and psychological hyperopia

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Abstract

How much joy versus pain people choose to experience for the present often inversely affects how much joy versus pain they will experience in the future. Do people make choices that maximize their overall happiness? Prior research suggests that people are generally myopic (i.e., over-choosing joy for the present). We suggest that the prior research may have biasedly focused only on situations in which the future is more important than the present. Rather, people are generally insufficiently sensitive to the relative importance of the present versus the future. When the future is more important than the present, people over-choose joy for the present, thus appearing myopic, but when the future is less important than the present, people under-choose joy for the present, thus appearing hyperopic. Six experiments (along with a reason-exploration study) demonstrate our propositions and show that forcing or nudging people to choose less (more) joy for the present when the future is more (less) important increases their overall happiness. This research challenges the popular view that people are generally myopic, and supports emerging research showing that people are generally situation-insensitive and can exhibit seemingly opposite biases (e.g., myopia and hyperopia) in different situations.

KEYWORDS
hyperopia, myopia, the present bias

1 | INTRODUCTION

Human lives consist of joy (e.g., play) and pain (e.g., work). How much joy versus pain one chooses for the present often inversely influences how much joy versus pain one will experience in the future. The more people work instead of playing today (or when they are young), the more they can play instead of having to work tomorrow (or when they are older). How do people make choices for the present that will influence the future? Do people's choices maximize their overall happiness, including both their current happiness and future happiness?

With a few exceptions (e.g., Keinan & Kivetz, 2008; Kivetz & Keinan, 2006; Kivetz & Simonson, 2002; Lovallo & Kahneman, 2000; Prelec & Loewenstein, 1998), most existing research suggests that people are myopic, placing excessive weight on immediate joy (Chakraborty, 2021; Fehr & Tyran, 2001; Hardisty & Weber, 2020; Mischel & Staub, 1965; Ramanathan & Menon, 2006; Yates & Watts, 1975) and showing a lack of self-control (Ainslie, 1975; Hoch & Loewenstein, 1991; Thaler, 1981).

In this research, we argue that people are neither generally myopic nor generally hyperopic. Rather, they are insufficiently sensitive to the future–present relationship, namely, the relative importance

between the present and the future. People will appear myopic if the future is more important than the present or appear hyperopic if the present is more important than the future. Previous research showing that people are generally myopic may have focused only on situations in which the future is more important than the present.

Our idea that people are insensitive to the future–present relationship has its roots in prior propositions about situation-insensitivity in self-control (Hsee et al., 2003, 2008). For example, Hsee et al. (2008) argued that "Most individuals do not effectively distinguish between situations that involve trade-offs between short-term and long-term experiences and those that do not, and their behavior is too regressive. When situations do involve such trade-offs, individuals often do not exert enough self-control, which yields a myopic response. When situations do not involve such trade-offs, individuals often rigidly apply these self-control mechanisms and deny themselves optimal happiness. The crux of this analysis is that the same individual can appear either too impulsive or too prudent depending on the nature of the trade-off between short-term and long-experiences" (p. 237).

More generally, recent research shows that people are insensitive to situational variables and may exhibit apparently opposite biases in different situations (e.g., Erev et al., 1994; Hsee et al., 2019; Larrick et al., 2007; Yang et al., 2022). For example, decision-makers are generally insensitive to the relevance of past costs to future costs and benefits; consequently, they will over-rely on past costs and hence exhibit the classic sunk cost bias if the past costs are irrelevant to future costs or benefits, and will under-rely on past costs and exhibit a "reverse sunk cost bias" if the past costs are highly relevant to future costs and benefits (Hsee et al., 2019).

In this research, we propose that decision-makers are insufficiently sensitive to the relative importance between the present and the future (i.e., the extent to which one's choice now will influence one's experience later). We define relative importance as follows. If for every unit of joy (or pain) one undertakes for the present, one will experience more than one unit of pain (or joy) in the future, the future can be perceived as more important than the present. If for every unit of joy (or pain) one undertakes for the present, one will experience less than one unit of pain (or joy) in the future, the future can be perceived as less important than the present. The relative importance of the present and the future can be operationalized by the duration of each phase and the magnitude of joy versus pain anticipated in each phase.

The future–present relationship points to a strategy that can maximize the overall amount of joy and minimize the overall amount of pain for the present and the future combined. If the future is more important than the present, one should choose to experience all pain for the present. If the future is less important than the present, one should choose to experience all joy for the present. For ease of exposition, we refer to this choice strategy as the *overall-ratio-maximizing strategy*.

In this research, we argue that the overall-ratio-maximizing strategy has a critical impact on people's overall happiness. Following Kahneman and colleagues' work (Kahneman et al., 1997, 2004), we define *overall happiness* as the sum of the moment-to-moment hedonic feelings that people experience in both the present and future. This definition of overall happiness assumes that every moment carries equal weight. Such a definition of overall happiness suggests that the future–present relationship is pivotal in affecting one's level of happiness. When the future is more important than the present, the future should have a greater impact on people's overall happiness than the present. When the future is less important than the present, the present should carry more weight in determining overall happiness. Thus, to maximize overall happiness, people should sufficiently incorporate the future–present relationship into their decisions and make the choice that prescribes, or is close to, the overall-ratio-maximizing strategy.

Note that the overall-ratio-maximizing strategy is not the only determinant of overall happiness. Previous research identifies other determinants, such as variety of experiences and temporal sequence of experiences. People prefer to have some variety in their experiences, as variety provides stimulation and offsets the boredom stemming from satiation (Etkin & Mogilner, 2016; Galak et al., 2009; Nelson & Meyvis, 2008; Sevilla & Redden, 2013; Simonson, 1990). People also prefer an improving sequence of experiences, getting the painful work done and saving the joyful play for the end (Hsee & Abelson, 1991; Loewenstein & Prelec, 1993). Nevertheless, variety and sequence are not as important to the hedonic experience as many would predict (Kahneman & Snell, 1992; Ratner et al., 1999; Simonson, 1990; Tully & Meyvis, 2016). Variety or sequence can enhance happiness when controlling for the amount of joy and pain one experiences. However, introducing variety or sequence to an experience inadvertently leads to an increase in the overall amount of pain when the amount of joy and pain form a tradeoff between the present and the future. Joy brings utility, pain brings disutility. It is plausible that the enjoyment of a joyful experience can be marginally boosted if it follows a painful one, yet such a marginal increase cannot sufficiently offset the disutility incurred from experiencing more pain in the aggregate. Therefore, we posit that the primary determinant of overall happiness is the overall joy-to-pain ratio. With the balance of other possible determinants, the choices that maximize happiness should be close to, but not necessarily identical to, the overall-ratio-maximizing strategy as described above.

In this research, we propose that people are not sufficiently sensitive to the relative importance of the present and the future, which hinders them from maximizing their overall happiness. When the future is more important than the present, we predict that people may not spend enough time on pain for the present (i.e., they spend less time on pain now than what would maximize their overall happiness) and thus appear myopic. When the future is less important than the present, we predict that people may not spend enough time on joy for the present (i.e., they spend less time on joy now than what would maximize their overall happiness) and thereby appear hyperopic. This future–present relationship insensitivity implies that people can appear myopic but also hyperopic. Both psychological myopia and psychological hyperopia stem from insufficient sensitivity to the relative importance of the present and future.

It should be noted that this insensitivity does not mean that people do not pay attention to, or do not understand, the relative importance of the present and the future, or that they cannot figure out how to maximize the overall joy-to-pain ratio. Rather, it means that people do not sufficiently incorporate their knowledge of the relative importance of the present and future into their decisions. In other words, people may not immediately recognize the impact of the overall-ratio-maximizing strategy on happiness and thus insufficiently consider it when making decisions.

In what follows, we present evidence from six experiments that support our theorizing. In Experiment 1, we show that people are insensitive to the relative importance of the present and future, and they make hedonically suboptimal choices both when the future is more important than the present and when it is less important. Experiments 2a and 2b conceptually replicate the results of Experiment 1. In particular, Experiment 2a adopts a more conservative choice interface by removing the option of viewing only one type of experience in both phases; Experiment 2b extends the happiness results to the overall retrospective measure of happiness, with a different representation of joy and pain. Experiment 3 shows that prompting people to deliberate in advance leads to hedonically better choices. Experiments 4 and 5 extend the generalizability of the theorizing using a lottery-game paradigm involving both hedonic and monetary consequences. Experiment 5 broadens the generalizability and operationalizes the future–present relationship by varying the relative strength of joy versus pain that participants experience.

2 | EXPERIMENT 1

Experiment 1 tested the proposition specified in the introduction: when allowed to choose freely, people tend to insufficiently incorporate the future–present relationship into their choice. When the future is longer and thus more important than the present, people choose more joy than the overall-ratio-maximizing strategy dictates. When the future is shorter and thus less important than the present, people choose less joy for the present compared to the overall-ratio-maximizing strategy. We also predict that forcing participants to follow an overall-ratio-maximizing strategy (i.e., to spend all their present phase on pain when the future is longer and all their present phase on joy when the future is shorter) will increase their overall happiness.

2.1 | Method

2.1.1 | Paradigm

The paradigm comprised two phases: Phase 1 (representing the present) and Phase 2 (representing the future). In each phase, participants view flower pictures (representing joy), cockroach pictures (representing pain), or some combinations of the two types of pictures. In a pretest ($N = 28$, $M_{Age} = 36.25$, $SD_{Age} = 12.04$, female = 42.86%), participants rated the experience of viewing the flower pictures as joyful ($M = 7.52$, $SD = 1.23$; 0 = *very painful*, 10 = *very joyful*) and viewing the cockroach pictures as painful ($M = 3.72$, $SD = 1.56$; $t[27] = 9.91$, $p < .001$, Cohen's $d = 1.87$).

In Phase 1, participants must view a total of N1 pictures. Before viewing each picture, participants were asked to choose its type, either flower or cockroach, and then they viewed a randomly selected picture of this type from our repertoire of flower and cockroach pictures. Each picture stayed on the screen for 1s before participants could rate their feelings at the moment. Participants were told in advance that they should make whatever choice that would make them happiest over the entire experiment (i.e., Phase 1 and Phase 2 combined).

Participants were also told in advance that in Phase 2, they must view a total of N2 pictures, and the proportion of flower to cockroach pictures is inversely related to that in Phase 1. In other words, the more flower (cockroach) pictures that participants chose to view in Phase 1, the more cockroach (flower) pictures they must view in Phase 2. The pictures in Phase 2 were presented in a random order. If the calculated proportion for Phase 2 was a non-integer number of flower (cockroach) pictures, the computer rounded it to the nearest integer.

We operationalized the key independent variable, the future–present relationship, as the ratio of N2 (i.e., number of pictures viewed in Phase 2) over N1 (i.e., number of pictures viewed in Phase 1). Assuming that it takes about the same amount of time to view each picture, then if N2 > N1, it means that the future is longer (and more important) than the present, and if N2 < N1, it means that the future is shorter (and less important) than the present. To verify this manipulation, we conducted a study in which N1 had 12 pictures, and N2 had either 4 or 36 pictures, then we asked participants to indicate the more important phase ($N = 100$, $M_{Age} = 41.02$, $SD_{Age} = 12.86$, female = 63.0%). Participants believed that Phase 1 was the more important phase (82.0%) when N2 = 4 and that Phase 2 was the more important phase (70.0%) when N2 = 36 ($\chi^2[1] = 27.44$, $p < .001$).

To control for possible influences of curiosity, participants sampled two flower pictures and two cockroach pictures at the beginning of the experiment. All participants were informed about the procedure and viewed sample flower and cockroach pictures in advance (see Appendix A in the Supporting Information). To ensure that they understood the paradigm and future–present relationship, participants had to correctly answer two comprehension questions before proceeding: the number of pictures they expected to view in each phase, and the relationship between the proportion of cockroach and flower pictures in the two phases. If they answered either question incorrectly, participants were required to read the instructions and answer these two questions again.

2.1.2 | Design

Experiment 1 employed a 2 (future–present relationship: future more important vs. future less important) × 3 (strategy: free choice

vs. overall ratio maximizing vs. yoked) mixed design. The manipulation of future–present relationship was within-subject. Participants experienced two rounds of the task. In one round, the future was more important than the present, and in another round, the future was less important than the present. We counterbalanced the order of this factor between-subjects. In all conditions, we held N1 (i.e., the total number of pictures in Phase 1) constant at 12 and varied N2 (the total number of pictures in Phase 2). In the future-more-important condition, N2 = 36, and in the future-less-important condition, N2 = 4.

The manipulation of strategy was between-subjects. In the free-choice condition, we asked participants to make their own choices in Phase 1. Participants made their choices sequentially: Before viewing each picture, they chose its type, either flower or cockroach, and then they viewed a randomly selected picture of this type from our repertoire of pictures. In the overall-ratio-maximizing condition, we did not allow participants to make their own choices but rather imposed the overall-ratio-maximizing strategy on them—they viewed all cockroach pictures in Phase 1 in the future-more-important condition and all flower pictures in Phase 1 in the future-less-important condition. We predicted that (a) participants in the free-choice condition would not adopt the overall-ratio-maximizing strategy, and (b) participants in the overall-ratio-maximizing condition would be happier overall than those in the free-choice condition.

Notably, the above two conditions involved a confound: Participants in the free-choice condition needed to make a choice, and those in the overall-ratio-maximizing condition did not. Therefore, differences in overall happiness between these two conditions could be attributed to whether or not participants needed to choose (Botti & Hsee, 2010; Dhar & Simonson, 2003) rather than what they chose. To address this issue, we added the yoked condition, in which we yoked each participant with a participant in the free-choice condition and assigned him/her the combination of pictures chosen by the corresponding participant in the free-choice condition. Thus, participants in this yoked condition viewed the same combinations of pictures as those in the free-choice condition, but they did not make choices. It should be noted that we yoked the number of picture choices for Phase 1 but allowed the computer to randomly draw the corresponding type of pictures from our inventory and present them in a random order. We predicted that participants in the overall-ratio-maximizing condition would be happier than participants in both the free-choice condition and the yoked condition.

2.1.3 | Measures

Our dependent variables are choice and overall happiness. Choice refers to the proportion of flower versus cockroach pictures that participants select in Phase 1. Overall happiness refers to the aggregate hedonic experiences sampled throughout this experiment. We adopted the experience sampling method following previous work on hedonic experience sampling (Kahneman et al., 2004). Specifically, we sample participants' hedonic experiences every time they view a picture: 1500 ms after each picture shows up on the screen, a question asking, "How do you feel now?" (1 = *bad*, 5 = *good*) appears below the picture. Participants need to respond to this question to view the next picture.

2.1.4 | Participants

We recruited US participants from Amazon Mechanical Turk. We had 278 participants (M_{Age} = 33.74, SD_{Age} = 11.58, female = 43.88%). No data were excluded.

2.2 | Results

2.2.1 | Choice

We ran a repeated-measure ANOVA with the number of flower pictures chosen by participants in the free-choice condition as the dependent variable, and the manipulation of future–present relationship and the order of the manipulation as independent variables. The results suggested that the order of the future–present relationship manipulation did not have a main effect (F[1, 91] < 0.01, p = .991, η_p^2 < 0.01) on the choice result. Importantly, at the within-subject level, we found a significant interaction between the order and the future–present relationship manipulation (F[1, 91] = 43.02, p < .001, η_p^2 = 0.32) that influenced choice (see Figure 1). In particular, as predicted, in the future-more-important condition, participants chose more flower pictures (M = 3.14, SD = 3.93) than what the overall-ratio-maximizing strategy would prescribe (t[92] = 7.70, p < .001, Cohen's d = 0.80). In the future-less-important condition, participants chose fewer flower pictures (M = 7.09, SD = 4.44) than the overall-ratio-maximizing strategy would prescribe (t[92] = −10.68, p < .001, Cohen's d = −1.11). These results were not driven by a few outliers—most participants (58.1% in the future-more-important condition and 68.8% in the future-less-important condition) did not adopt the overall-ratio-maximizing strategy. We found consistent results across all the studies and reported follow-up analyses of these two groups in Appendix B in the Supporting Information.

2.2.2 | Overall happiness

We calculated a participant's overall happiness by taking the sum of his/her happiness ratings sampled during the experiment. We ran a repeated-measure ANOVA with overall happiness as the dependent variable, and the manipulation of future–present relationship, strategy, and the order of the future–present relationship manipulation as independent variables. The analysis found no main effect of the order (F[1, 272] = 0.15, p = .703, η_p^2 < 0.01). In addition, because the total length (N1 + N2) of the future-more-important condition was longer than that of the future-less-important condition, we found a

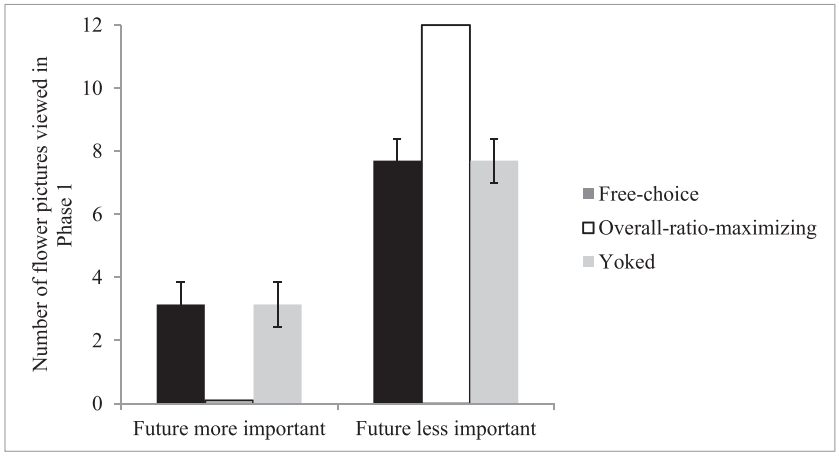

FIGURE 1 Flower pictures viewed in Phase 1 of Experiment 1.

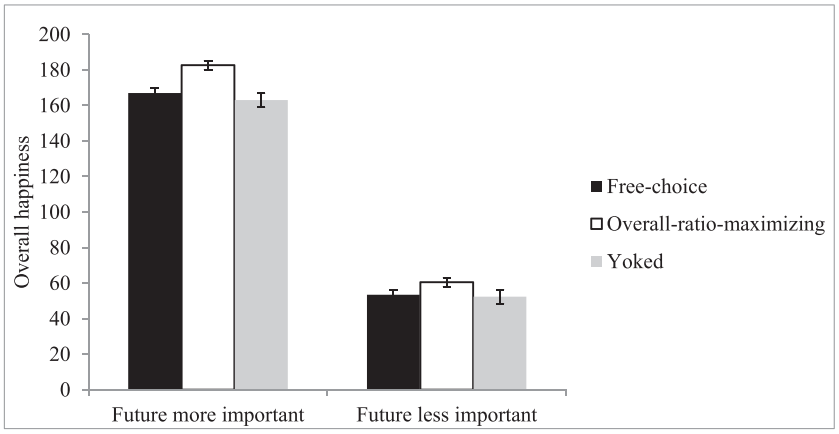

FIGURE 2 Overall happiness in Experiment 1.

significant interactive effect of future–present relationship and the order of manipulation at the within-subject level (F[1, 272] = 5514.73, p < .001, η_p^2 = 0.95).

Notably, the analysis revealed a significant three-way interaction (F[2, 272] = 4.75, p = .009, η_p^2 = 0.03). In support of our theory, we found a significant main effect of strategy (F[2, 272] = 18.65, p < .001; see Figure 2). Specifically, in the future-more-important condition, participants in the overall-ratio-maximizing condition (M = 182.70, SD = 24.58) were happier than both those in the free-choice condition (M = 167.01, SD = 31.59; t[275] = 3.85, p < .001, Cohen's d = 0.57) and those in the yoked condition (M = 163.02, SD = 26.50; t[275] = 4.83, p < .001, Cohen's d = 0.71). No difference was found between the free-choice condition and the yoked condition (t[275] = 0.98, p = .327, Cohen's d = 0.14).

Similarly, in the future-less-important condition, participants in the overall-ratio-maximizing condition (M = 60.53, SD = 8.84) were happier than both those in the free-choice condition (M = 53.40, SD = 10.15; t[275] = 5.08, p < .001, Cohen's d = 0.75) and those in the yoked condition (M = 52.30, SD = 9.64; t[275] = 5.86, p < .001, Cohen's d = 0.86). Overall happiness did not differ between the free-choice and yoked conditions (t[275] = 0.78, p = .435, Cohen's d = 0.12).

2.3 | Discussion

Experiment 1 revealed two main findings, one about choice and one about happiness. In terms of choice, participants with the freedom to choose did not employ the overall-ratio-maximizing strategy. In terms of happiness, participants who were required to follow the overall-ratio-maximizing strategy were happier than those who did not adhere to the strategy, regardless of whether the latter participants made their own choices or were yoked to others' choices. These results do not mean that adopting the overall-ratio-maximizing strategy necessarily maximizes overall happiness, but rather that participants in the free-choice condition could have done better—they would have been happier overall if they had adopted the overall-ratio-maximizing strategy.

Interestingly, having experienced the future–present tradeoff does not make people more sensitive to the future–present relationship. In this experiment, all participants experienced one round where the future was more important than the present and one round where the future was less important than the present. In Round 2, after experiencing the tradeoff, participants still replicated the hypothesized effects: Those in the future-more-important condition chose more flower pictures than the overall-ratio-maximizing strategy

($M = 7.34$, $SD = 4.80$; $t[50] = -6.86$, $p < .001$, Cohen's $d = -0.97$), and participants in the future-less-important condition chose fewer flower pictures than the overall-ratio-maximizing strategy ($M = 2.84$, $SD = 4.07$; $t[42] = 4.58$, $p < .001$, Cohen's $d = 0.70$).

3 | EXPERIMENTS 2A AND 2B

Experiments 2a and 2b aimed to conceptually replicate the findings of Experiment 1 with the following modifications.

First, Experiments 2a and 2b included only two conditions for the decision strategy manipulation: the free-choice condition and the overall-ratio-maximizing condition. We removed the yoked condition because whether or not participants were able to choose the picture type did not influence their overall happiness in Experiment 1.

Second, we manipulated the future–present relationship between-subjects, rather than within-subject.

Third, in the free-choice condition of Experiment 1, participants made their choices sequentially, one at a time. Such a selection architecture allowed participants to arrange pictures in Phase 1 following their preferred patterns. Consequently, participants in Experiment 1 might have preferred patterns of experiences in mind and thus did not follow the overall-ratio-maximizing strategy. To control for this potential confound, in the free-choice condition of Experiments 2a and 2b, participants were required to make one comprehensive choice in advance. At the beginning of Phase 1, we listed all the possible combinations of flower and cockroach pictures (Experiment 2a) or combinations of play and work tasks (Experiment 2b) that participants can choose for Phase 1. Participants were asked to select the number of flower pictures or play tasks for Phase 1 and were informed that the selected combination of pictures or tasks would show up in a random order in both phases.

4 | EXPERIMENT 2A

In Experiment 1, the overall-ratio-maximizing strategy was to choose only one type of picture in each phase. It is possible that many participants did not adopt this strategy because they believed that they should avoid the extreme option—that is, viewing only one type of picture in each phase (Read et al., 2001; Simonson, 1990). To control for this potential alternative account, we conducted Experiment 2a, in which the overall-ratio-maximizing strategy required participants to view both types of pictures in each phase.

4.1 | Methods

Experiment 2a employed a 2 (future–present relationship: future more important vs. future less important) × 2 (strategy: free choice vs. overall ratio maximizing) between-subjects design. The manipulation of future–present relationship was the same as in Experiment 1.

We eliminated the most extreme options (i.e., viewing only one type of picture) in this experiment. Thus, all the provided viewing options mentioned above required participants to view both types of pictures in each of the two phases. In the future-more-important condition, the overall-ratio-maximizing strategy was to view 11 cockroach pictures and 1 flower picture in Phase 1; in the future-less-important condition, the overall-ratio-maximizing strategy was to view 11 flower pictures and 1 cockroach picture in Phase 1.

A total of 248 Prolific workers completed this experiment. We excluded four responses of duplicate IP addresses, leaving 244 valid responses ($M_{Age} = 34.48$, $SD_{Age} = 12.44$, female = 62.3%). Similar to Experiment 1, participants had to correctly answer one comprehension question about the instructions (number of pictures in two phases and the relationship of the two types of pictures in two phases) to be able to proceed to the experiment. The measure of overall happiness was the same as in Experiment 1.

4.2 | Results

4.2.1 | Choice

Consistent with the findings of Experiment 1, in the free-choice condition, participants in the future-more-important condition chose more flower pictures ($M = 4.94$, $SD = 3.69$) in Phase 1 than recommended by the overall-ratio-maximizing strategy ($t[61] = 8.39$, $p < .001$, Cohen's $d = 1.07$). In the future-less-important condition, participants chose fewer flower pictures ($M = 7.51$, $SD = 2.36$) in Phase 1 than the overall-ratio-maximizing strategy would prescribe ($t[58] = -11.37$, $p < .001$, Cohen's $d = -1.48$). Most participants did not adopt the overall-ratio-maximizing strategy: 69.4% in the future-more-important condition and 81.4% in the future-less-important condition did not choose the overall-ratio-maximizing option (see Appendix B in the Supporting Information for follow-up analyses).

4.2.2 | Overall happiness

We conducted a 2 (future–present relationship: future more important vs. future less important) × 2 (strategy: free choice vs. overall ratio maximizing) ANOVA on overall happiness. The analysis did not find an interaction effect ($F[1, 240] = 3.51$, $p = .062$, $\eta_p^2 = 0.01$). Similarly, since the total length of the future-more-important condition was longer than that of the future-less-important condition, the analysis found a main effect of the future–present relationship ($F[1, 240] = 2210.81$, $p < .001$, $\eta_p^2 = 0.90$). In line with findings of Experiment 1, the analysis revealed a significant main effect of strategy ($F[1, 240] = 22.02$, $p < .001$, $\eta_p^2 = 0.08$). Specifically, in the future-more-important condition, participants in the overall-ratio-maximizing condition ($M = 171.39$, $SD = 17.07$) were happier than those in the free-choice condition ($M = 156.37$, $SD = 29.92$; $t[121] = -3.41$, $p < .001$, Cohen's $d = -0.62$). Similarly, in the

future-less-important condition, participants in the overall-ratio-maximizing condition ($M = 59.55$, $SD = 6.43$) were also happier than those in the free-choice condition ($M = 53.10$, $SD = 5.80$; $t[119] = -5.78$, $p < .001$, Cohen's $d = -1.05$).

5 | EXPERIMENT 2B

In Experiment 1, people's overall happiness was the aggregation of happiness measures sampled immediately after viewing each picture. This experience sampling method was adopted because the relative importance between the present and the future was operationalized as the *duration* of two phases. Prior research has suggested that the experience sampling method, compared to retrospective evaluation, is more sensitive to the duration of an experience (Fredrickson & Kahneman, 1993; Kahneman et al., 1997). However, retrospective happiness can provide unique insights into people's experience. Experiment 2b aimed to replicate our findings with tretrospective evaluation of people's overall happiness.

5.1 | Method

In addition to the modifications summarized above, Experiment 2b made the following three unique modifications.

First, in the first two experiments, we used flower and cockroach pictures to represent joy and pain. In Experiment 2b, we introduced more-prolonged experiences to represent joy and pain: work vs. play tasks. Each work task required participants to view four unpleasant pictures (that were randomly drawn from an inventory of unpleasant pictures, covering contents such as trash bins, cockroaches, polluted landscape, and deserted houses) and to identify the most unpleasant one. Each play task required participants to view a pleasant video (that was randomly drawn from an inventory of pleasant video clips, covering themes such as beautiful landscape and funny moments of pets) for 20 s. Each task was sufficiently long to change participants' feelings at the moment and thus allowed for a more meaningful interpretation of the happiness sampled through the experiment.

Second, we introduced the retrospective evaluation of happiness at the end of the experiment. Participants indicated their overall happiness via the following question: "Overall, the first two did you have a good time during Study 1? (1 = *not at all*; 7 = *very much*)" To mitigate potential influences from the final task that participants completed in Phase 2 (i.e., the peak-end effect), we introduced a filler study prior to the retrospective evaluation of happiness. In this filler study, participants believed that they were undertaking an unrelated Study 2 about game evaluation, in which they played the classic video game Break-Out for 1 min. In addition, we increased the granularity of the scale point to reduce the potential carry-over influences from earlier happiness measures.

Third, in Experiments 1 and 2a, we held the length of Phase 1 (N1) constant and manipulated the future–present relationship by varying the length of Phase 2 (N2). That design made the choice results between the future-more-important and the future-less-important conditions comparable but introduced a potential confound for happiness results, in that the future-more-important condition was longer than the future-less-important condition. In this experiment, we kept the overall length of the experiment (N1 + N2) constant and varied the relative lengths of Phase 1 (N1) and Phase 2 (N2). In the future-more-important condition, N1 = 3 and N2 = 6; in the future-less-important condition, N1 = 6 and N2 = 3.

To recap, this experiment employed a 2 (future–present relationship: future more important vs. future less important) × 2 (strategy: free choice vs. overall ratio maximizing) between-subjects design. A total of 238 workers from Prolific completed this experiment. Following the pre-registered data-exclusion procedures, we excluded 38 participants who reported distractions during the experiment, leaving 200 valid responses ($M_{Age} = 38.26$, $SD_{Age} = 11.46$, female = 48.5%).

5.2 | Results

5.2.1 | Choice

In line with the findings of the previous experiments, participants chose and completed more play tasks ($M = 0.98$, $SD = 0.87$) than what the overall-ratio-maximizing strategy would prescribe when the future was more important ($t[46] = 7.70$, $p < .001$, Cohen's $d = 1.12$). Similarly, they chose and completed fewer play tasks ($M = 1.75$, $SD = 1.70$) than the overall-ratio-maximizing strategy when the future was less important ($t[52] = -18.21$, $p < .001$, Cohen's $d = -2.50$). Most participants (63.8% in the future-more-important condition and 94.3% in the future-less-important condition) did not adopt the overall-ratio-maximizing strategy (see Appendix B in the Supporting Information for follow-up analyses).

5.2.2 | Overall happiness

We subjected a 2 (future–present relationship: future more important vs. future less important) × 2 (strategy: free choice vs. overall ratio maximizing) ANOVA on overall happiness. The analysis did not find an interaction effect ($F[1, 196] = 0.21$, $p = .645$, $\eta_p^2 < 0.01$) nor a significant main effect of future–present relationship ($F[1, 196] = 2.29$, $p = .132$, $\eta_p^2 = 0.01$). Replicating the results of the previous experiments, we found a significant main effect of decision strategy ($F[1, 196] = 50.18$, $p < .001$, $\eta_p^2 = 0.20$). Free choice reduced people's overall happiness in both the future-more-important condition ($M_{FreeChoice} = 30.55$, $SD_{FreeChoice} = 5.67$ vs. $M_{Maximizing} = 35.47$, $SD_{Maximizing} = 4.24$, $t[96] = 4.88$, $p < .001$, Cohen's $d = 0.99$) and the future-less-important condition ($M_{FreeChoice} = 29.87$, $SD_{FreeChoice} = 4.20$ vs. $M_{Maximizing} = 34.18$, $SD_{Maximizing} = 4.22$, $t[100] = 5.17$, $p < .001$, Cohen's $d = 1.03$).

5.2.3 | Retrospective happiness

The results of retrospective happiness were consistent with the results of overall happiness: we did not find a significant interaction (F [1, 196] = 0.02, p = .878, η_p^2 < 0.01) nor a main effect of future–present relationship (F[1, 196] = 0.06, p = .812, η_p^2 < 0.01) on retrospective happiness. However, we found a consistent significant main effect of decision strategy (F[1, 196] = 8.33, p = .004, η_p^2 = 0.04). When the future was more important, participants who made their own choice (M = 3.43, SD = 1.04) were less happy than those who followed the overall-ratio-maximizing strategy (M = 3.80, SD = 0.85, t [96] = 1.98, p = .050, Cohen's d = 0.40). Similarly, when the future was less important, participants in the free-choice condition (M = 3.42, SD = 0.82) also reported lower happiness than those in the overall-ratio-maximizing condition (M = 3.76, SD = 0.80, t[100] = 2.11, p = .037, Cohen's d = 0.42).

5.3 | Discussion

Experiments 2a and 2b replicated the results of Experiment 1. In particular, participants consistently failed to choose the option that maximizes the overall joy-to-pain ratio, even with all the options requiring participants to experience both joy and pain (Experiment 2a) or even with different representations of joy versus pain (Experiment 2b). In addition, participants who made their own choice were less happy, in terms of the aggregation of happiness sampled (Experiments 2a and 2b) and retrospective happiness (Experiment 2b), compared to participants forced to follow the overall-ratio-maximizing strategy.

6 | EXPERIMENT 3

According to our hypothesis, the results in the free-choice condition of the first three experiments are best explained by insensitivity to the future–present relationship—participants insufficiently incorporated it into their choice. However, there is a potential alternative explanation that those in the free-choice condition may have mispredicted which strategy would maximize their overall happiness. For instance, participants may have selected the variety strategy, erroneously assuming that viewing a mixture of cockroach and flower pictures in each phase would maximize their overall happiness (Read et al., 2001; Simonson, 1990), or they may have selected the temporal strategy, erroneously assuming that viewing cockroach pictures first and flower pictures later would maximize their overall happiness (Hsee & Abelson, 1991; Loewenstein & Prelec, 1993).

There is a key difference between our future–present relationship insensitivity account and the misprediction account. According to the former account, people are capable of predicting that a strategy close to the overall-ratio-maximizing strategy will bring them greater overall happiness. When making choices, however, people use heuristics and intuitive processing (System 1) rather than deliberative processing (System 2), and they do not deliberately make that prediction (Evans, 2003; Kahneman, 2003). Thus, our account of future–present relationship insensitivity predicts that prompting people to deliberate the hedonic consequences of their choices should make them notice (i.e., sensitize them to) the relative importance between the present and the future, steering their choices toward the overall-ratio-maximizing strategy. By contrast, according to the misprediction account, people hold inaccurate beliefs about which strategy will maximize overall happiness—so their choices are an accurate reflection of what they believe will maximize their happiness. Thus, the misprediction account does not anticipate any effect of prompting people to deliberate the hedonic consequences of their impending choices. Experiment 3 aimed to tease apart these two accounts.

6.1 | Method

Experiment 3 adopted a 2 (future–present relationship: future more important vs. future less important) × 2 (deliberation prompt: with vs. without) between-participants design.

Like Experiment 2b, Experiment 3 held the sum of pictures (N1 + N2) constant at 16, and it manipulated the future–present relationship by varying N1 and N2. In the future-more-important condition, N1 = 4 and N2 = 12, and in the future-less-important condition, N1 = 12 and N2 = 4.

In all the conditions, at the beginning of Phase 1, participants were free to choose how many flower (vs. cockroach) pictures to view in Phase 1 that would make them happiest during the entire experiment. Later, the corresponding number of flower and cockroach pictures was presented in a random order. In the condition that prompted deliberation, prior to any choices being made, we reminded participants of the lengths of the two phases and the future–present tradeoff, and we asked them to pause and think carefully about the combination of cockroach and flower pictures in Phase 1 that would maximize their overall happiness in the entire experiment. Participants did not need to write down any answers, but they had to think for 10 s before making choices. In the condition that deliberation was not prompted, participants did not receive these instructions.

Similar to the previous experiments, participants needed to answer the same comprehension questions about the instructions to proceed. We adopted the same overall happiness measure as in Experiment 1.

We recruited 281 participants (M_{Age} = 36.79, SD_{Age} = 10.93, female = 44.8%) from Amazon Mechanical Turk. No data were excluded.

6.2 | Results

6.2.1 | Choice

An ANOVA with the number of flower pictures chosen for Phase 1 as the dependent variable revealed a significant interaction effect between the future–presentation relationship and deliberation prompt (F[1, 277] = 13.89, p < .001, η_p^2 = 0.05). In addition, we

found a significant main effect of future–present relationship (F[1, 277] = 802.27, p < .001, $\eta_p^2 = 0.74$) and no significant main effect of deliberation prompt (F[1, 277] = 2.68, p = .103, $\eta_p^2 = 0.01$).

In particular, the results in the without-deliberation condition replicated those in the free-choice condition of the previous experiments. In the future-more-important condition, participants chose more flower pictures (M = 1.52, SD = 1.39) in Phase 1 than recommended by the overall-ratio-maximizing strategy (t[62] = 8.70, p < .001, Cohen's d = 1.10). In the future-less-important condition, participants chose fewer flower pictures (M = 8.21, SD = 3.06) in Phase 1 than recommended by the overall-ratio-maximizing strategy (t[72] = −10.60, p < .001, Cohen's d = −1.24). A total of 66.7% of participants in the future-more-important condition and 69.9% in the future-less-important condition did not follow the overall-ratio-maximizing strategy (see Appendix B in the Supporting Information for follow-up analyses).

However, prompting participants to deliberate (i.e., to predict the hedonic consequences of their choice) brought the choice into closer alignment with the overall-ratio-maximizing strategy. In the future-more-important condition, participants in the deliberation-prompt condition chose fewer flower pictures in Phase 1 (M = 0.96, SD = 1.33) than did participants in the no-deliberation-prompt condition (M = 1.52, SD = 1.39; t[129] = 2.39, p = .018, Cohen's d = 0.42). In the future-less-important condition, participants in the with-deliberation condition chose more flower pictures in Phase 1 (M = 9.66, SD = 2.60) than did participants in the without-deliberation condition (M = 8.21, SD = 3.06; t[148] = −3.15, p = .002, Cohen's d = −0.51; see Figure 3). These results are consistent with our future–present relationship insensitivity account and inconsistent with the alternative misprediction account, suggesting that people deviate from the overall-ratio-maximizing strategy because they fail to consider the future–present relationship.

6.2.2 | Overall happiness

We conducted a 2 (future–present relationship: future more important vs. future less important) × 2 (deliberation prompt: with vs. without) ANOVA on overall happiness. The analysis did not find an interaction effect (F[1, 277] = 0.08, p = .779, η_p^2 < 0.01). Since the overall length (N1 + N2) was the same for the future-more-important condition and the future-less-important condition, we did not find a main effect of the future–present relationship (F[1, 277] = 1.13, p = .289, η_p^2 < 0.01).

The analysis did reveal a significant main effect of deliberation (F[1, 277] = 8.40, p = .004, $\eta^2 = 0.03$). In particular, in the future-more-important condition, participants prompted to deliberate (M = 45.74, SD = 8.10) indicated greater overall happiness than those in the without-deliberation condition (M = 42.97, SD = 7.74; t[129] = 2.00, p = .048, Cohen's d = 0.35). Likewise, in the future-less-important condition, participants in the with-deliberation condition (M = 46.42, SD = 5.96) reported greater overall happiness than participants in the without-deliberation condition (M = 44.14, SD = 7.30; t[148] = 2.10, p = .038, Cohen's d = 0.34). These results indicate that prompting participants to deliberate not only brought their choices into closer alignment with the overall-ratio-maximizing strategy, it increased their overall happiness.

6.3 | Discussion

The findings of Experiment 3 offer further evidence of insensitivity to the future–present relationship, corroborating the results of Experiments 1 and 2—participants with the freedom to choose deviated from the hedonically optimal flower-to-cockroach picture ratio and experienced less overall happiness. Experiment 3 additionally showed that participants who were prompted to deliberate made choices that aligned more closely with the overall-ratio-maximizing strategy, and they experienced greater overall happiness.

6.4 | Reason-exploration study

Results of Experiment 3 suggest that prompting deliberation can influence participants to better incorporate the future–present relationship into their choice. However, it remains unclear why people did not

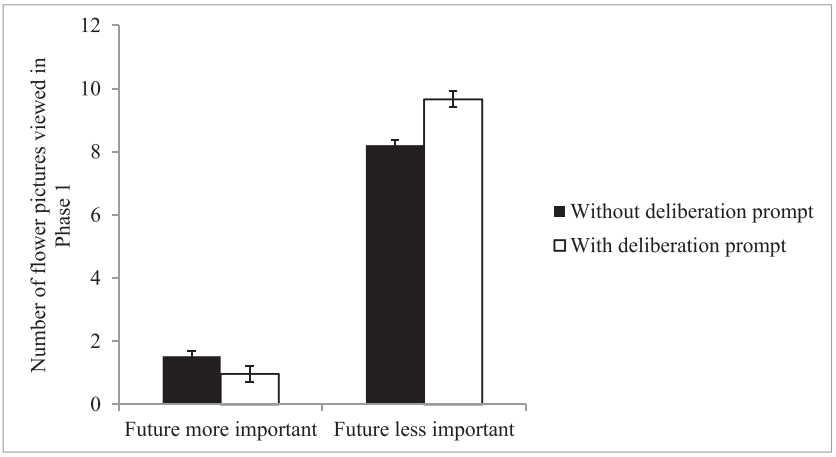

FIGURE 3 Flower pictures viewed in Phase 1 in Experiment 3.

follow the overall-ratio-maximizing strategy when deliberation was not prompted. To investigate the reasons behind the participants' choices, we conducted a pre-registered reason-exploration study, adopting a similar procedure to Experiment 3. Following the pre-registered data-exclusion criteria, we excluded three participants who reported experiencing distraction during the study, leaving a total of 298 valid responses. Participants ($M_{Age} = 41.51$, $SD_{Age} = 12.35$, female = 36.6%) were randomly assigned to conditions of a 2 (future–present relationship: future more important vs. future less important) × 2 (deliberation prompt: with vs. without) design. In this study, we held Phase 1 constant (N1 = 12) to compare the choice results. N2 = 36 when the future was more important, and N2 = 4 when the future was less important. After learning the procedures in their assigned condition, participants indicated how many pictures of each type (flower vs. cockroach) they would choose to view in Phase 1. Upon making their choice, participants needed to indicate the primary reason for that choice: (a) "to maximize overall flower pictures and minimize overall cockroach pictures I can view," (b) "to have some variety in both phases," (c) "to delay viewing cockroach pictures," (d) "to end with viewing flower pictures," and (e) "other reasons."

We replicated the choice results in this reason-exploration study. When the future was more important than the present, participants chose fewer flower pictures after being prompted to deliberate their choice ($M = 3.36$, $SD = 3.55$) in Phase 1 compared to those who did not deliberate ($M = 5.14$, $SD = 3.83$; $t[145] = 2.92$, $p = .004$, Cohen's $d = 0.48$). When the future was less important than the present, participants chose more flower pictures upon deliberation ($M = 7.55$, $SD = 3.50$) in Phase 1 compared to those who did not deliberate ($M = 6.27$, $SD = 3.41$; $t[149] = 2.28$, $p = .024$, Cohen's $d = 0.37$).

The choice shares of reasons revealed (1) why people did not follow the overall-ratio-maximizing strategy when they can freely make their choice and (2) how a deliberation prompt changed participants' choice.

First, in the two free-choice conditions, variety seeking was considered as the most important factor (40.3% in the future-more-important condition vs. 54.5% in the future-less-important condition). It was perceived to be more important than maximizing the overall ratio of pictures (33.3% in the future-more-important condition vs. 24.7% in the future-less-important condition). Second, the deliberation prompt changed the relative choice share of these two reasons. When the future was more important, deliberation made overall-ratio-maximizing the main reason driving the choice (53.3%) relative to variety seeking (24.0%). Similarly, when the future was less important, deliberation prompted participants to recognize the importance of overall ratio maximizing (41.9%) relative to variety seeking (36.5%). Such a shift in reasons was statistically significant for both the future-more-important ($\chi^2[1] = 6.36$, $p = .012$) and future-less-important conditions ($\chi^2[1] = 6.07$, $p = .014$). The percentages of the other three reasons were less than 20% and remained unchanged across conditions (see Appendix C in the Supporting Information for detailed descriptive results).

These responses offer useful insights about why people did not adopt the overall-ratio-maximizing strategy when deliberation was prompted. Most participants wanted to view a mixture of the two types of pictures in each phase, opting for variety seeking as an approach to maximizing their overall happiness (Ratner et al., 1999; Read & Loewenstein, 1995; Simonson, 1990). This does not mean that those participants consciously believed that variety would maximize their happiness. Rather, variety seeking is a choice heuristic that people employ, often spontaneously adopted without fully taking the future–present relationship into account. Once being prompted to carefully think about the relative importance of the present and the future, upon reflection, people recognize the importance of maximizing the overall joy (and minimizing the overall pain) and thus choose options closer to the overall-ratio-maximizing strategy.

Drawing on the combination of findings from this reason-exploration study and Experiment 3, we suggest the following: When asked to make a choice, people underweight the influence of the relative importance between the present and the future on their overall happiness; instead, they make choices using heuristics, especially variety seeking, and thus appear either myopic or hyperopic. When asked to deliberate, however, people realize that they would be happier with the overall-ratio-maximizing option (or an option close to it) that reflects the future–present relationship, and they adjust their choices accordingly.

7 | EXPERIMENT 4

Experiment 4 was a conceptual replication of the other experiments, with two methodological differences. First, instead of adopting the experience-based paradigm used in Experiments 1–3, Experiment 4 adopted a lottery-game paradigm involving actual monetary gains (joy) and losses (pain) to the participants.

Second, the first three experiments had only one criterion—happiness—for judging the quality of a decision. Experiment 4 introduced two criteria: happiness (subjective) and monetary earnings (objective). We predicted that when choosing freely, participants would make suboptimal choices in terms of both happiness and earnings, and that when being exogenously enforced to take the option that maximizes their overall earnings (i.e., "overall-ratio-maximizing strategy"), they would do better in terms of both happiness and earnings.

7.1 | Method

Experiment 4 employed a 2 (future–present relationship: future more important vs. future less important) × 2 (strategy: free choice vs. overall ratio maximizing) between-subjects design. Instead of viewing pictures, participants played a series of lottery games.

As in the other experiments, this experiment consisted of two phases. The future–present relationship was manipulated by the number of games in Phase 1 (N1) and Phase 2 (N2). In all conditions, Phase 1 always consisted of eight games. In the future-more-important condition, Phase 2 had 16 games, and in the future-less-important condition, Phase 2 had four games.

In each game, we showed participants 10 cards face-down on the computer screen, and we explained that some were winning cards, and some were losing cards. Participants could click on one of the 10 cards to turn it over. If the card was a winning card, they would earn 2 cents; if the card was a losing card, they would lose 1 cent.

We further told participants in advance that all games in Phase 1 shared the same winning chance, all games in Phase 2 shared the same winning chance, and the winning chance of the games in Phase 2 was inversely related to the winning chance of the games in Phase 1, as shown in Table 1.

Participants in the free-choice condition were instructed to set the winning chance of the games in Phase 1 by choosing one of the probabilities in Table 1, with the knowledge that the computer would set the inverse winning chance for the games in Phase 2.

Participants in the overall-ratio-maximizing condition did not see Table 1; instead, they were told that their winning chance was predetermined. In the future-more-important condition, because Phase 2 had twice as many games (N2 = 16) as Phase 1 (N1 = 8), the overall-ratio-maximizing strategy involved the lowest possible winning chance (10%) for the games in Phase 1. Conversely, in the future-less-important condition, because Phase 2 had half as many games (4) as Phase 1 (8), the overall-ratio-maximizing strategy involved the highest possible winning chance (90%) for the games in Phase 1.

After receiving the above instructions (and setting the winning chance for Phase 1, in the free-choice condition) and correctly answering a comprehension question about the instructions (the number of games they expected to play in each phase and the relationship of the winning chances in the two phases), participants played the games. The computer randomly generated results (winning vs. losing) for each game based on the winning chance. After each game, participants learned the outcome and reported their feelings at the moment on a 5-point scale (1 = *not very good*, 5 = *extremely good*). After completing all the games, participants were asked to report their retrospective experience of the entire experiment on the same scale.

We received 200 complete responses via Prolific. At the end of the experiment, participants reported whether they experienced any significant technical problems. If so, they were asked to explain them in detail. Any inconsistencies between the identification of a technical problem and the explanation were identified as problematic behavior. We identified one such response and removed the participant from further analysis. Ultimately, we had a sample size of 199 (M_{Age} = 36.93, SD_{Age} = 11.29, female = 53.8%).

TABLE 1 Winning chances of the games in each phase.

Phase 1 Winning chance, set by participants	Phase 2 Inverse winning chance, set by computer
10%	90%
20%	80%
30%	70%
40%	60%
50%	50%
60%	40%
70%	30%
80%	20%
90%	10%

Note: There was no 0% or 100% option because the stimuli were chance-based games.

7.2 | Results

7.2.1 | Choice

Participants who chose freely deviated from the overall-ratio-maximizing strategy. In the future-more-important condition, those in the free-choice condition set the winning chance of the games in Phase 1 at an average of 53.18% (*SD* = 22.49%), significantly higher than the optimal chance of 10% ($t[43] = 12.74$, $p < .01$, Cohen's $d = 1.92$). In the future-less-important condition, participants in the free-choice condition set the winning chance of the games in Phase 1 at an average of 65.74% (*SD* = 20.71%), significantly lower than the optimal chance of 90% ($t[53] = -8.61$, $p < .01$, Cohen's $d = -1.17$). In addition, 88.6% of participants in the future-more-important condition and 68.5% of participants in the future-less-important condition did not follow the overall-ratio-maximizing strategy (see Appendix B in the Supporting Information for follow-up analyses).

7.2.2 | Overall happiness

As in the other studies, participants' overall happiness is the sum of all happiness ratings measured during the experiment. A 2 (future–present relationship: future more important vs. future less important) × 2 (strategy: free choice vs. overall ratio maximizing) ANOVA found no interaction ($F[1, 195] = 1.17$, $p = .282$, $\eta_p^2 = 0.01$). The analysis uncovered a significant main effect of the future–present relationship ($F[1, 195] = 339.18$, $p < .001$, $\eta_p^2 = 0.64$) and a significant main effect of strategy ($F[1, 195] = 10.46$, $p = .001$, $\eta_p^2 = 0.05$). As Figure 4 shows, in the future-more-important condition, participants in the free-choice condition were less happy ($M = 67.86$, $SD = 17.31$) than participants in the overall-ratio-maximizing condition ($M = 75.58$, $SD = 13.48$; $t[92] = -2.43$, $p = .017$, Cohen's $d = -0.50$). Similarly, in the future-less-important condition, participants in the free-choice condition were less happy ($M = 36.85$, $SD = 10.48$) than participants in the overall-ratio-maximizing condition ($M = 40.71$, $SD = 8.07$; $t[103] = -2.10$, $p = .038$, Cohen's $d = -0.41$).

7.2.3 | Retrospective happiness

As Figure 4 presents, retrospective happiness, as measured at the end of the experiment, paralleled overall happiness measured during the

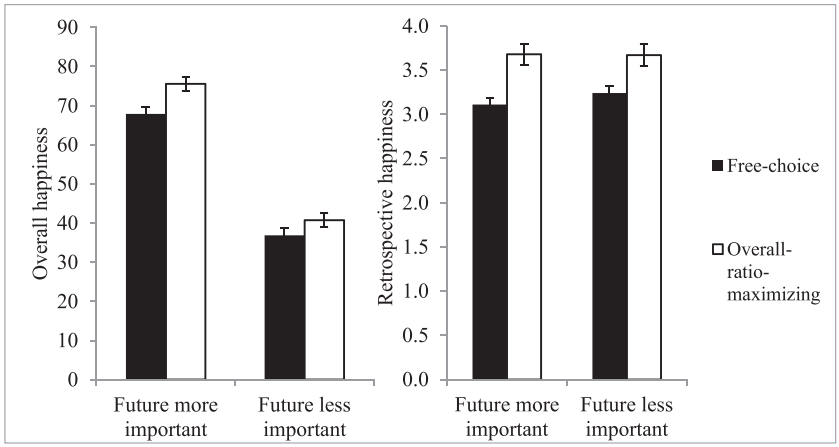

FIGURE 4 Happiness in Experiment 4.

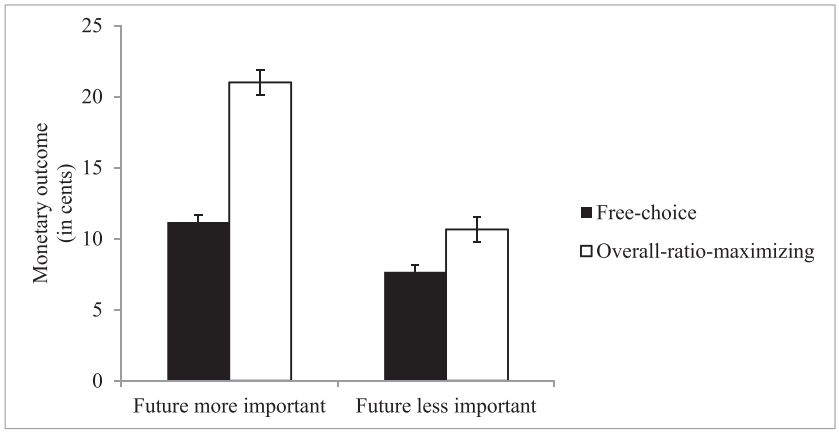

FIGURE 5 Monetary outcome in Experiment 4.

experiment. An ANOVA did not find an interaction effect (F[1, 195] = 0.25, p = .616, η_p^2 < 0.01). In line with prior research suggesting that retrospective happiness is less sensitive to duration (Kahneman et al., 2004), we did not find a main effect of the future–present relationship (F[1, 195] = 0.17, p = .685, η_p^2 < 0.01). Notably, we did find a significant main effect of strategy (F[1, 195] = 12.60, p < .001, η_p^2 = 0.06). In particular, in the future-more-important condition, participants in the free-choice condition were less happy (M = 3.11, SD = 1.13) than participants in the overall-ratio-maximizing condition (M = 3.68, SD = 0.82; t[92] = −2.81, p = .006, Cohen's d = −0.58). Similarly, in the future-less-important condition, participants in the free-choice condition were less happy (M = 3.24, SD = 1.18) than those in the overall-ratio-maximizing condition (M = 3.67, SD = 0.74; t[103] = −2.20, p = .030, Cohen's d = −0.43).

7.2.4 | Monetary outcomes

Participants in the free-choice condition earned significantly less money (in cents) than participants in the overall-ratio-maximizing condition (see Figure 5). A 2 (future–present relationship: future more important vs. future less important) × 2 (strategy: free choice vs. overall ratio maximizing) ANOVA on monetary earnings found a significant interaction (F[1, 195] = 25.85, p < .001, η_p^2 = 0.12), as well as a significant main effect of strategy (F[1, 195] = 90.56, p < .001, η_p^2 = 0.32) and a significant main effect of the future–present relationship (F[1, 195] = 106.33, p < .001, η_p^2 = 0.35) as participants in the future-more-important condition played more games. Of note, in the future-more-important condition, participants in the free-choice condition earned less (M = 11.18, SD = 6.48; in cents) than participants in the overall-ratio-maximizing condition (M = 21.00, SD = 3.26; t[92] = −9.44, p < .001, Cohen's d = −1.95). The same was true in the future-less-important condition—participants in the free-choice condition also earned less (M = 7.67, SD = 5.43) than participants in the overall-ratio-maximizing condition (M = 10.65, SD = 3.08; t[103] = −3.44, p < .001, Cohen's d = 0.67).

7.3 | Discussion

Experiment 4 conceptually replicated the key finding of the other studies, with a different paradigm that allowed us to assess not only the hedonic (subjective) consequences of participants' choices but also the monetary (objective) consequences.

Regardless of the future–present relationship (i.e., whether Phase 2 contained more or fewer games than Phase 1), participants in the free-choice condition set a rather moderate winning probability for the games in Phase 1, deviating significantly from the

overall-ratio-maximizing strategy. Consequently, compared with participants who played the games with predetermined (optimal) chances, participants who chose freely ended up with less money, and they felt less happy both during the experiment (momentary) and at the end (retrospective).

8 | EXPERIMENT 5

Experiment 5 aims to conceptually replicate the findings of previous experiments, using a different manipulation of the future–present relationship. In everyday life, many factors contribute to the perceived importance of the phase, such as the duration of a phase (examined in Experiments 1–4) and the strength of joy versus pain that one experiences. For instance, one may perceive a weekend at home as less important than a weekend camping with friends, as the latter is more enjoyable. Conversely, one may perceive the day of receiving the rejection from a dream opportunity to be more important than the day of being late for work, as the former is more painful. Because the magnitude of joy versus pain experienced in a phase can impact its perceived importance, Experiment 5 explored the future–present from this perspective. We thus adapted the lottery-game paradigm in Experiment 4, using the amount of actual monetary gains (joy) and losses (pain) to manipulate the future–present relationship. In particular, in the more-important phase, one expected to win and lose greater amounts of money for all the lottery games.

8.1 | Method

Experiment 5 employed a 2 (future–present relationship: future more important vs. future less important) × 2 (strategy: free choice vs. overall ratio maximizing) between-subjects design. Similar to Experiment 4, participants played lottery games and experienced actual monetary gains and losses (which were rewarded as bonus pay). In each game, participants picked a card from a set of 10 cards facing down. Some were winning cards, and others were losing cards.

Similar to other experiments, this experiment had two phases. Instead of varying the relative lengths of two phases, we kept the length of Phase 1 (N1) and Phase 2 (N2) identical. Across all the conditions, participants played four games in Phase 1 (N1) and four games in Phase 2 (N2). We manipulated the future–present relationship by varying the amount of monetary gains and losses in the two phases. In the future-more-important condition, a winning card meant gaining 2 cents and a losing card meant losing 1 cent in Phase 1, whereas a winning card meant gaining 4 cents and a losing card meant losing 2 cents in Phase 2. In the future-less-important condition, a winning card meant gaining 4 cents and a losing card meant losing 2 cents in Phase 1, whereas a winning card meant gaining 2 cents and a losing card meant losing 1 cent in Phase 2. All games in each phase shared the same winning chance. The winning chance of games in Phase 2 was inversely related to that in Phase 1 (see Table 1).

In the free-choice condition, participants could set the winning chance of all the games in Phase 1 by selecting one of the options listed in Table 1 (i.e., ranging from 10% to 90%, with increments by 10%), with the understanding that the computer sets the winning chance of all the games in Phase 2 as inversely correlated with the winning chance in Phase 1. In the overall-ratio-maximizing condition, the winning chance of Phase 1 was predetermined to maximize the overall payoff. It was set as 10% in the future-more-important condition and 90% in the future-less-important condition.

The focal dependent variables were happiness and monetary outcomes. Since we kept the length of the two phases identical and manipulated future–present relationship by varying the amount of monetary rewards that participants gained versus lost, it is plausible that the happiness sampled after each game is less sensitive than the retrospective happiness upon reacting to magnitudes in gains and losses (Kahneman et al., 1997, 2004). To better capture the impact of varied magnitudes of joy (winning) versus pain (losing) on people's happiness, we increased the granularity of the scale to 7 points (1 = *bad*, 7 = *good*) for all the happiness measures. Similar to the previous experiments, participants had to correctly answer a comprehension question about the instructions to be able to start the experiment.

A total of 200 Prolific workers ($M_{Age} = 41.23$, $SD_{Age} = 12.03$, female = 59.0%) participated in this experiment. No data were excluded. This experiment was pre-registered.

8.2 | Results

8.2.1 | Choice

Replicating findings of the previous experiments, participants in the free-choice condition did not follow the overall-ratio-maximizing strategy. Specifically, when the future was more important, participants set the winning chance of all the games in Phase 1 as 44.04% ($SD = 17.90\%$), which was higher than the overall-ratio-maximizing strategy ($t[46] = 13.04$, $p < .001$, Cohen's $d = 1.90$). By contrast, when the future was less important, participants set the winning chance of all the games in Phase 1 as 65.96% ($SD = 20.51\%$), which was lower than the overall-ratio-maximizing strategy ($t[51] = -8.45$, $p < .001$, Cohen's $d = -1.17$). Most participants (i.e., 89.4% in the future-more-important condition and 69.2% in the future-less-important condition) did not employ the overall-ratio-maximizing strategy (see Appendix B in the Supporting Information for follow-up analyses).

8.2.2 | Overall happiness

We calculated the overall happiness by taking the sum of happiness ratings sampled throughout the experiment. An ANOVA with the overall happiness as dependent variable revealed an insignificant interaction ($F[1, 196] = 2.06$, $p = .152$, $\eta_p^2 = 0.01$) and a

significant main effect of future–present relationship (F[1, 196] = 5.43, p = .021, η_p^2 = 0.03). Of note, we found a main effect of decision strategy on overall happiness (F[1, 196] = 16.98, p < .001, η_p^2 = 0.08; see Figure 6). In line with our prediction, in the future-more-important condition, directionally, participants who employed the free-choice strategy were less happy (M = 33.64, SD = 5.58) than those who followed the overall-ratio-maximizing strategy (M = 35.82, SD = 5.32; t[95] = −1.97, p = .052, Cohen's d = −0.40). Similarly, in the future-less-important condition, participants in the free-choice condition were less happy (M = 34.37, SD = 6.58) than those in the overall-ratio-maximizing strategy condition (M = 38.88, SD = 5.36; t[101] = −3.81, p < .001, Cohen's d = −0.75).

8.2.3 | Retrospective happiness

The findings of retrospective happiness aligned well with the results of overall happiness. An ANOVA with future–present relationship and decision strategy as independent variables revealed a significant main effect of decision strategy (F[1, 196] = 16.67, p < .001, η_p^2 = 0.08), while the main effect of future–present relationship (F[1, 196] = 1.23, p = .268, η_p^2 = 0.01) and the interaction (F[1, 196] = 0.63, p = .428, η_p^2 <0.01) remained insignificant. In particular, when the future was more important, those in the free-choice condition were less happy (M = 4.40, SD = 1.41) than those in the overall-ratio-maximizing condition (M = 5.24, SD = 1.10; t[95] = −3.27, p = .002, Cohen's d = −0.66). Similarly, when the future was less important, those in the free-choice condition were less happy (M = 4.73, SD = 1.37) than those in the overall-ratio-maximizing condition (M = 5.29, SD = 0.90; t[101] = −2.46, p = .016, Cohen's d = −0.48).

8.2.4 | Monetary outcomes

Using an ANOVA with monetary outcomes (in cents) as the dependent variable, we did not find significant interaction effects (F[1, 196] = 0.50, p = .479, η_p^2 < 0.01) nor a main effect of future–present relationship (F[1, 196] = 0.15, p = .695, η_p^2 <0.01). Importantly, we found a main effect of decision strategy (F[1, 196] = 42.20, p < .001, η_p^2 = 0.18; see Figure 7). In the future-more-important condition, participants who followed the free-choice strategy earned less (M = 6.32, SD = 5.64) than did those who followed the overall-ratio-maximizing strategy (M = 11.40, SD = 3.64; t[95] = −5.31, p < .001, Cohen's d = −1.08); in the future-less-important condition,

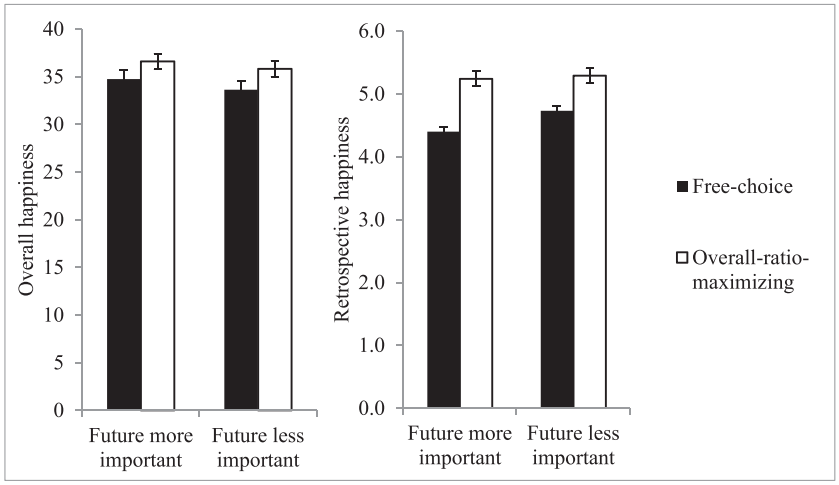

FIGURE 6 Happiness in Experiment 5.

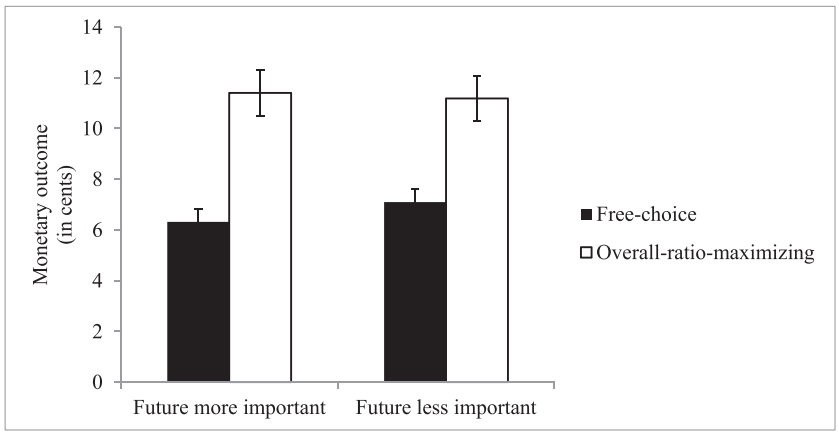

FIGURE 7 Monetary outcome in Experiment 5.

participants who followed the free-choice strategy also earned less ($M = 7.10$, $SD = 6.20$) than those who followed the overall-ratio-maximizing strategy ($M = 11.18$, $SD = 3.98$; $t[101] = -3.96$, $p < .001$, Cohen's $d = -0.78$).

8.3 | Discussion

Experiment 5 provides a conceptual replication of key findings of the previous experiments, using magnitudes of joy versus pain experienced to manipulate the relative importance of the present and future. Irrespective of the future–present relationship, participants in the free-choice condition set a moderate winning chance for games in both phases. Consequently, participants who could freely choose were less happy and earned less money, compared to those who followed the overall-ratio-maximizing strategy.

9 | GENERAL DISCUSSION

People frequently face decisions where joy and pain are inversely correlated between the present and future. For instance, choosing to eat a rich dessert or skipping a workout might offer immediate pleasure but risk future health, while working overtime or saving money can impose immediate sacrifice but lead to future financial comfort and life satisfaction. The process underlying such tradeoff decisions has long been a topic of interest among both scholars and laypeople. This work offers a new perspective on this age-old question, positing that people can appear myopic or hyperopic, depending on the relative importance of the present and future.

To test the proposition, we introduce a two-phase paradigm that involves picture viewing or lottery playing. We find robust evidence to support our proposition that when the future is more important than the present, people choose more joy than what the overall-ratio-maximizing strategy would prescribe and thereby appear myopic. Conversely, when the future is less important than the present, they choose less joy than what the overall-ratio-maximizing strategy would prescribe and appear hyperopic.

This research contributes to the literature in two important ways. First, it offers a fresh interpretation that bridges the seemingly contradictory perspectives of people's preference for when to consume joy versus pain. On the one hand, research on myopia suggests that people value joy obtained immediately and heavily discount joy obtained in the delayed future (Fehr & Tyran, 2001; Hardisty & Weber, 2020; Mischel & Staub, 1965; Ramanathan & Menon, 2006; Yates & Watts, 1975), which is manifested as lack of self-control (Ainslie, 1975; Hoch & Loewenstein, 1991; Thaler, 1981; Wertenbroch, 1998) and impatience (Koopmans, 1960; Loewenstein, 1996). On the other hand, research on hyperopia suggests that people delay joy more than pain (Lovallo & Kahneman, 2000; Prelec & Loewenstein, 1998) and that they exercise too much self-control because the selection of joy evokes guilt, which is difficult to justify (Keinan & Kivetz, 2008; Kivetz & Keinan, 2006; Kivetz & Simonson, 2002; Lascu, 1991). Our research reveals a novel perspective that harmonizes these divergent streams of discussion on the preferred timing of joy. People are neither always myopic nor always hyperopic. Rather, they can be insensitive to the relative importance between the present and the future and tend to diversify the allocation of their present time on both joy and pain. When the future is more important than the present, people allocate portions of their present time to joy and thus appear myopic. Conversely, when the future is less important than the present, people allocate portions of their present time to pain and thus appear hyperopic.

Second, insights of this research advance our understanding of variety seeking and its impact on people's happiness. Prior research suggests that variety seeking can enhance people's overall happiness. For instance, introducing or merely expecting variety can disrupt hedonic adaptation and enhance the enjoyment of an experience (Galak et al., 2009; Nelson & Meyvis, 2008). In addition, consumers typically appreciate choice sets among varied products (Read & Loewenstein, 1995; Simonson, 1990). Contrary to prior research suggesting the benefits of variety, this research shows that variety seeking can be less important than other factors in impacting happiness, such as the overall joy-to-pain ratio.

It should be noted that insensitivity to the future–present relationship does not mean that people do not notice the relative importance between the present and the future or that they cannot figure out the overall-ratio-maximizing strategy. In a follow-up experiment to Experiment 1, we introduced a condition in which numbers of both types of pictures were explicitly shown for each option. We found that freeing participants from math calculation did not change their choices (see Appendix B in the Supporting Information for detailed results), suggesting that the results of choice were not driven by whether people could or could not identify the overall-ratio-maximizing option. The insensitivity of the future–present relationship means that people underweight the impact of the overall-ratio-maximizing strategy on their happiness and thus insufficiently incorporate the future–present relationship into their choices. Upon deliberation (as shown in the reason-exploration study), many participants were able to recognize the importance of maximizing the overall joy and minimizing the overall pain.

Across experiments, we used the experience sampling method as the primary method to capture people's overall happiness. This choice was motivated by our use of duration as a key factor in defining the future–present relationship. The experience sampling method has been shown to account for duration information more effectively than retrospective evaluation (Fredrickson & Kahneman, 1993; Kahneman et al., 1997). To complement our understanding of the phenomenon, in Experiments 2b, 4, and 5, we introduced the retrospective measure of happiness and showed that the results of both the experience sampling method and the retrospective method align well in capturing people's happiness. In the current research, when participants faced the tradeoff between the present and future, the overall joy-to-pain ratio played a more central role in affecting happiness sampled throughout the experience and measured retrospectively.

The current research leaves many questions unanswered. One concerns the option that maximizes people's overall happiness. We proposed and found that the overall-ratio-maximizing strategy yields better hedonic experiences than the strategy that most people choose on their own. However, this does not mean that the overall-ratio-maximizing strategy is the optimal strategy. It is possible that a strategy that is close, but not identical, to the overall-ratio-maximizing strategy is hedonically optimal. For an individual participant, it is possible that the hedonically optimal strategy was not to view the same type of pictures but to insert a few pictures of a different type in a long series, which disrupts hedonic adaptation to flower pictures and thereby enhances overall enjoyment (Nelson & Meyvis, 2008). Although we do not find evidence showing that this interruption effect applies to our research, future research could explore the hedonically optimal strategy.

While this research provides a conservative test of the future–present relationship using minimalistic experiments, it does recognize its limited external validity. The relative importance of the present and the future was manipulated through precise descriptions of length or monetary rewards. However, everyday life can involve a more ambiguous representation of the two phases. For instance, people tend to believe that the future is more important when making long-term career plans, and they tend to assume that the present is more important when they need to plan their work for the week. Although people may not be able to accurately predict the exact duration or magnitude of an experience, they are able to infer the relative importance of the two phases based on intuition, personal preferences, or even social norms. We encourage future research to explore other factors that can impact the perceived importance of the present versus the future, with a goal of extending the external validity of this research.

In addition, this research focused on one typical instance of the future–present relationship. That is, the amount of joy (vs. pain) one can experience in the future is inversely related to the amount of joy (vs. pain) for the present. In many situations, the relationship between the amount of joy (vs. pain) for the present and the future might be positively, or even not, correlated. We encourage future research to extend the boundaries of our findings. In particular, it would be illuminating to investigate whether people still employ the heuristic of variety seeking when facing other types of future–present relationships.

Our research carries a more nuanced implication than the prevalent view about how to help people make hedonically better decisions. Most existing research in the psychology literature depicts people as psychologically myopic and recommends helping them gain more self-control. By contrast, our work suggests that the true culprit is not psychological myopia but insensitivity to the future–present relationship. Many decisions involve tradeoffs between present and future, such as how to set up pension plans for people who have various retirement plans, how much work and fun parents should introduce to their children, or how much one can enjoy a party and make sure the second-day work is not influenced. It is not always helpful to encourage people to exert self-control or choose variety seeking. People can make better decisions not by overcoming psychological myopia per se but rather by sufficiently incorporating the relative importance of the present and the future into their decisions.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are openly available in Open Science Framework at https://osf.io/tdknm/?view_only=379530d221ad4b168b527330851dc3b6.

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SUPPORTING INFORMATION

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How to cite this article: Wei, S., & Hsee, C. K. (2023). Future–present relationship insensitivity: A new perspective on psychological myopia and psychological hyperopia. *Journal of Behavioral Decision Making*, e2358. https://doi.org/10.1002/bdm.2358