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Needing Everything (or Just One Thing) to Go Right: Myopic Preferences for Consolidating or Spreading Risks

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Succeeding at a task often depends on the success or failure of component events. Such multicomponent risks can take one of two general forms. Disjunctive risks require the success of just one such component; conjunctive risks, all of them. Seven studies converge to show people prefer to consolidate disjunctive risks into fewer components and to spread conjunctive risks across more components, independent of the objective or subjective implications for the probability of overall success. These tendencies were reflected in preferences for how to approach potential investors, decisions about how much to invest in different business opportunities, and gamble valuations. Such preferences were specific to multicomponent risks as compared to single-component risks whose overall prospects for success were yoked to participants' own perceptions of a matched multicomponent risk. Participants confronted multicomponent risks myopically, swayed by whether positive or disappointing news would likely be delivered at a single point in time instead of by the overall prospects for success. Supporting this account, these preferences for consolidating or spreading risks were reduced when the components' outcomes would be revealed at once. Anticipated confidence while proceeding through the risk (even controlling for perceived probabilities of success) explained these preferences. After all, these preferred risk structures actually do allow people to traverse a multicomponent risk with more confidence that the next piece of news they receive will be positive (or not negative), though such myopic perspectives neglect just how many components will offer a chance for success (disjunctive risks) or the potential for failure (conjunctive risks).

Keywords: multicomponent risk, confidence, myopia, choice bracketing, anticipated experience

Supplemental materials: https://doi.org/10.1037/pspa0000343.supp

Employers, policymakers, and entrepreneurs often have to decide whether to gamble. They must choose not merely whether to accept, but sometimes how to structure, risks they confront. Although people are accustomed to describing risks as though they are single events (e.g., "Whether we can pull this deal together is really a coin flip"), risks are often decomposable into component parts. A PhD candidate looking for an extra year of academic funding may need just one (of many) grant submissions to be successful. That same PhD candidate who puts together a nontraditional dissertation proposal may need to successfully convince not merely one but all members of their dissertation committee to sign off.

In both cases, the student faces a multicomponent risk. Meeting their overarching goal requires some number of successes among individual component tasks. We call risks of the first type *disjunctive risks*—those in which the overall outcome is a success if at least one of the component parts is successful. We call risks of the latter type *conjunctive risks*—those in which the overall outcome is a success if and only if each component part is successful.

Multicomponent risks differ not only in how success is achieved, but also over how many components that risk is spread. Sometimes potential risk-takers[1] have no say over how many components are involved (e.g., the size of the PhD student's committee is set). In other cases, the risk-taker may have control over how many components there are. An entrepreneur who needs just one angel investor may pursue this disjunctive risk by spending her month trying to perfect her pitch to the different, idiosyncratic tastes of three potential benefactors. Instead, she may try the same boilerplate approach with 30 unique investors. A businessman for whom success depends on the financial backing of every venture capital firm he approaches might consider whether to approach five larger firms with a big-dollar ask or 10 firms with a more financially modest and achievable request. In these examples, as described, there is a dependency between the

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[1] For simplicity, we often refer to those considering how to structure or value a risk as a "risk-taker," even though technically one is not a risk-taker until one has officially accepted the risk.

number of risk components and the likelihood of each component succeeding. Of course, without more information about these distinct probabilities, it is uncertain which course of action—*spreading* the risk (across more components) or *consolidating* the risk (into fewer components)—is objectively superior.

In the present article, we propose that (and seek to explain why) people's preferences for spreading or consolidating risks depend on the conjunctive or disjunctive nature of the multicomponent risk that they confront. To study this question, we engineer our studies so that the probabilities of overall success are—objectively or subjectively—equivalent.

We concede that part of the difficulty with evaluating multicomponent risks is the statistical challenge of translating beliefs that a single component will result in good news (e.g., the perceived probability that a single investor will help fund one's startup) to the probability that the multicomponent risk as a whole will result in a success (e.g., the probability that at least one [disjunctive] or all [conjunctive] investors one approaches will agree to invest). But as we develop below, we think that multicomponent risk-takers' preferences are guided not simply by their difficulty with math, but by their expectations of how they will feel as the risk unfolds. How people make such affective evaluations will have predictable consequences for whether, when, and why risk-takers will prefer that multicomponent disjunctive or conjunctive risks be spread or consolidated into more or fewer components.

Preferences for Consolidating Versus Spreading Risks

Consider disjunctive and conjunctive risks that: (a) vary in the extent to which they are spread over more or consolidated into fewer components, but (b) offer the same overall objective probabilities of success. We consider this trade-off not to suggest that spreading or consolidating any risk necessarily (or even typically) has no implications for the probability of overall success. Instead, we are merely trying to understand why consolidated or spread risks that should otherwise be equivalently attractive (in terms of their true likelihood of resulting in an overall success) seem more or less enticing. More generally, if X is the independent probability of success of each component and Y is the number of components, then the probability that a disjunctive risk (one that requires only one component to be successful) is an overall success is $1 - (1 - X)^Y$. The probability that a conjunctive risk (one that requires all components to be successful) is an overall success is X^Y.

This implies that in the set of multicomponent risks that are equivalent in their objective likelihood of success, there will be a negative dependency between X and Y for disjunctive risks, but a positive dependency between X and Y for conjunctive risks. In plainer English, a disjunctive risk remains just as likely to yield an overall success when spreading the risk across more components is accompanied by a certain negative shift in each component's probability of success. Flipping at least one heads in two coin flips (a two-component, and thus relatively consolidated, disjunctive risk) is about as probable as rolling at least one "6" in eight die rolls (an eight-component, and thus relatively spread disjunctive risk). In contrast, a conjunctive risk remains as objectively attractive when the spreading of the risk across more components is accompanied by a certain *positive* shift in each component's probability of success. Flipping two tails in two coin flips (a two-component, and thus relatively consolidated conjunctive risk) is about as likely as rolling a 1, 2, 3, 4, or 5 on all of eight die rolls (an eight-component, and thus relatively spread, conjunctive risk).

We argue that decision makers confronted by (subjectively or objectively equiprobable) disjunctive or conjunctive risks will have a preference to *consolidate* or *spread* such risks into fewer or across more components, respectively. We identify two, nonmutually exclusive reasons why this might be the case. First, an *anchoring* account recognizes that most people are not statisticians. Translating information about the chance of each component's success into an estimate that at least one component or all components will succeed requires (more than) a bit of mathematical sophistication. As a result, people may anchor on each individual component's probability and adjust insufficiently to arrive at an estimate of the multicomponent risk's overall probability of success (Gneezy, 1996). By this process, the subjective probability of a joint event may be systematically biased in the direction of the probability of its components (Bar-Hillel, 1973; Holtgraves & Skeel, 1992; Linville et al., 1993; Slovic, 1969; Slovic et al., 1978). This means that when considering disjunctive or conjunctive risks that have the same overall probability of success, decision makers may be more drawn to disjunctive risks that consolidate the risk into fewer components and conjunctive risks that spread the risk across more components. After all, anchoring and insufficient adjustment may lead decision makers to mistake such multicomponent risks as offering more favorable odds.

Our second and focal account rests on the idea that risk-takers will care not only about the perceived probability of an overall success, but also the anticipated experience during the multicomponent risk's resolution. In the domain of risk-taking, it is known that decision-making is influenced not merely by cold, expected-value-maximizing calculations. Also influential are affect-driven cues (e.g., comfort, fear) that accompany contemplation of the decision and describe what one would expect to feel as the moment of truth approaches (Gal & Rucker, 2021; Loewenstein et al., 2001; Pope, 1983). More generally, anticipated experiences—and biases in such forecasts—explain consequential life choices, such as the maintenance of addictive behaviors and decisions around seeking psychological help (Redish et al., 2008; Ruzek et al., 2011). Furthermore, people make decisions in an effort to manage their affective experience. As one example, people often prefer to speed up the onset of an aversive experience, because they wish to minimize how long they will experience preemptive dread (Harris, 2012; Loewenstein, 1987).

What—other than the likelihood that a multicomponent risk will ultimately yield success—would shape people's anticipation of how it would feel to proceed through a multicomponent risk? Multicomponent risks, by their very nature, are often resolved across time. People receive favorable or unfavorable news about individual components (e.g., that an investor was favorably moved or underwhelmed by one's pitch); in combination, these components determine whether an endeavor is an overall success (e.g., whether one's start-up is funded). As people contemplate such protracted experiences, their affective evaluations tend to display what Kahneman (2000) called evaluation by moments, a consideration of what one would experience at a single moment in time. In the process, they display *duration neglect*, a specific form of extension neglect (Kahneman, 2000). For example, Schreiber and Kahneman (2000) found that participants judged a noise to be aversive on the basis of its intensity, but not its duration (see also Kahneman et al., 1993). Applied to multicomponent risks, this suggests that people's experiential forecasts may be sensitive to how they would expect to feel at individual moments (e.g., as they imagine a single component being relatively likely or unlikely to yield good news), but display relative neglect of the scope (i.e., whether the inclusion of more components offers more opportunities for success or more obstacles to survive).

This *myopia* account is lent plausibility by the numerous ways that decision makers are known to neglect the big picture and instead base decisions on their evaluations of narrower, more specific components. Sometimes this reflects near-term short-sightedness: People are swayed by impulses and temptations that derail them from achieving their goals (Hoch & Loewenstein, 1991); stagnate during periods of uncertainty because they fail to look ahead and realize that their local preferences do not actually depend on the resolution of such uncertainty (Shafir, 1994; Tversky & Shafir, 1992); and actually make decisions without giving sufficient thought to the implications for future realities the decision makers will confront (Kahneman & Lovallo, 1993; Read et al., 1999), especially when under cognitive load (Worthy et al., 2012). Such patterns have also been seen in examinations of multicomponent risks. When facing a conjunctive risk (in which one must succeed at every component), people would rather the components offering a high probability of success precede those offering a low probability. This preference can be strong enough to push people to prefer lotteries with a lower expected value than alternatives (Budescu & Fischer, 2001; Cohen et al., 1972; Ronen, 1973).

In other cases, people display what has been called myopia not necessarily because they focus on what is temporally next, but simply because they lose the forest for the individual trees. People display myopic loss aversion (Benartzi & Thaler, 1995) when they think about the risk inherent to how an equity will perform in a single time period instead of internalizing how short-term shocks to valuation will be smoothed over the duration of its holding (Hardin & Looney, 2012; Looney & Hardin, 2020). More generally, decision makers display what Kahneman and Lovallo (1993, p. 22) called "extraordinary myopia" when they partition life's choices into a set of individually consequential choices instead of a set of decisions that combine to yield an aggregate outcome. Read et al. (1999) made this point by arguing that decision makers often make the mistake of *narrow bracketing*, or considering the consequences of choices in isolation; instead, decision makers should be *broad bracketing*, thinking about how all the consequences of individual consequences will sum up. Nonchalant smokers commit this error when accurately noting that any one cigarette does minimal damage while neglecting that a lifetime of smoking—consumed one cigarette at a time—will take a more severe toll.

On the one hand, myopic evaluations of multicomponent risks are not an example of narrow choice bracketing. After all, in the contexts we consider, there is not a decision to make about each individual component. But our account does appeal to a similar underlying psychological process. That is, we posit that people will evaluate the experience of traversing a multicomponent risk by narrowly considering each individual piece of feedback they will receive (e.g., how it will feel when a component is likely to deliver good or bad news) without a full appreciation for the number of components that compose the risk. In that sense, we expect people confronting conjunctive risks may focus too much on "surviving another day" (Cohen et al., 1972), thereby preferring to spread risks, comforted by the prospect that each individual component is unlikely to deal the determinative blow. For example, basketball coaches tend to try sending a game to overtime by taking a low-risk two-point shot instead of trying to win the game with an immediate, but lower-probability three-pointer (Walker et al., 2018). In contrast, people facing disjunctive risks may prefer to put all their eggs in fewer baskets, thereby upping the confidence that they expect to feel at any one moment in time, but reducing the number of baskets that they have to potentially benefit from.

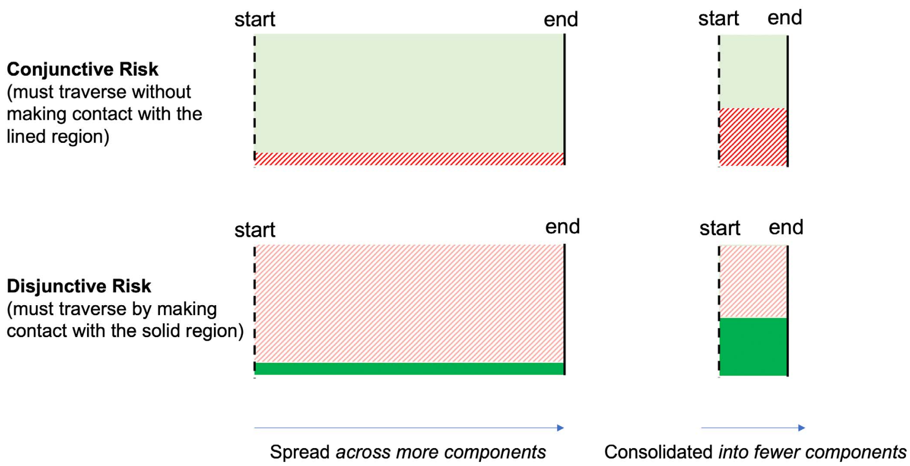
Figure 1 introduces a stylized depiction of multicomponent risks of each type. In each of the four depicted tracks, a multicomponent risk-taker would need to traverse the track, from start to end. The length of the track (from left to right) corresponds to the number of components one would face. At each stop along the track, the risk-taker would find themselves at a random position between the top and the bottom. For a conjunctive risk, which requires no misses, one would need to go the entire width without veering into the lined region. But for a disjunctive risk, which requires just one success, one would merely need to make contact with the solid region. A decision maker who myopically considers the experience of traversing the risk by considering their prospects at any single moment in time would be enticed by the narrowness of the losing lane (spread, conjunctive risk) or the width of the winning lane (consolidated, disjunctive risk). The folly comes from neglecting the length (or shortness) of the respective tracks.

This myopia account, with its focus on anticipated experience at individual moments, makes three predictions that distinguish it from the anchoring account, which argues that people will merely fail to adjust sufficiently from the probability that each individual component will yield a success when trying to determine the prospects for overall success. First, the myopia account suggests that people should still display a relative preference for consolidating disjunctive (vs. conjunctive) risks even when they learn that the overall probabilities of success are equivalent (or if the perceived probability of success is statistically controlled). Second, this myopia should be evident in participants' anticipated experience: Such judgments should prioritize the prospects for receiving good (or avoiding bad) news at individual moments of the risk's unfolding, without sufficient sensitivity to the number of opportunities for good news (or chances to receive bad news). Such anticipated experience should predict valuation of risks independently of the (objectively stated or subjectively estimated) probability of success. Third, only the myopia account anticipates that the time course of how the components are revealed should influence participants' valuation of the multicomponent risk. News regarding the multiple components could be revealed all at once (instead of being sequentially revealed across moments in time). A simultaneous reveal of components' outcomes means that spreading or consolidating cannot be used to change individual moments into more confidence-inspiring or anxiety-minimizing ones. Stated differently, the results of different components no longer occur at different moments that can then be myopically evaluated. For example, a scholarship student who needs at least a "B" in every class to maintain their funding may prefer to open their course grades one at a time (given they may be fairly confident for each individual class that they did well enough), though this benefit will be reduced if they scan their entire transcript at once (in essence, consolidating the risk into a single period).

The Present Research

Seven studies test our hypotheses regarding people's interest in consolidating disjunctive risks and spreading conjunctive risks.

Figure 1
Stylized Examples of Spread and Consolidated Conjunctive and Disjunctive Risks



Note. In these stylized examples of spread (left half) and consolidated (right half) multicomponent risks, a risk-taker would need to traverse the length of the track either without making contact with the lined region (conjunctive risk) or by making contact with the solid region (disjunctive risk). The number of components that constitute each multicomponent risk is captured by the length of each track. Each component would be a "stop" (not depicted) along the track, at which point the risk-taker would find themselves at a random location at that point on the track. Myopia would lead people to focus on one's prospects at a single point in time (the width of the solid compared to the lined lane) instead of the total number of stops (the length of the track), which would enhance the appeal of (equiprobable) spread conjunctive risks and consolidated disjunctive risks. See the online article for the color version of this figure.

The studies explore these preferences in different contexts: Participants considered being an entrepreneur seeking the support of potential investors (Study 1), role-played a manager deciding how much to invest in different potential workplace projects (Studies 2–3), or indicated their interest in taking different gambles that would pay out depending on the outcomes of multiple die rolls (Studies 4a–6). In each study, we took steps to assess participants' preferences for consolidating or spreading risks independent of their real or perceived likelihood of yielding an overall success. We did this by either explicitly informing participants that the approaches had no influence on the overall prospects for success (Study 1), comparing preferences for multicomponent risks against preferences for single-component risks ideographically constructed to offer equivalent subjective probabilities of success (Study 2), statistically controlling for participants' subjective beliefs that a multicomponent risk would result in an overall success (Studies 3 and 6), or examining a theoretically relevant moderator (i.e., the time course over which feedback about each component would be revealed) that does not change the mathematical challenge of determining the multicomponent risk's likelihood of yielding an overall success (Studies 4a–6).

In several studies, we measured the anticipated experience of proceeding through the multicomponent risk to determine whether such beliefs explained participants' interest in the risks (Studies 1, 3, and 6). Furthermore, we examined two key moderators. First, we recognized that for mixed gambles a conjunctive [disjunctive] risk of a positive outcome can be reframed as a disjunctive [conjunctive] risk of a negative outcome. This symmetry allowed us to test whether the interest in spreading conjunctive risks and consolidating disjunctive risks reverses when those risks describe the criteria for experiencing a loss (Studies 3 and 6). Second, we varied the time course by which a multicomponent risk would be played out (Studies 4a, 4b, and 6) or revealed (Study 5) to test whether our focal myopia account accurately anticipates when preferences for spreading or consolidating multicomponent risks will be attenuated.

We took several steps to maximize confidence that our studies would be well-powered. First, we were mindful of the common difficulty of knowing true effect sizes a priori. Appreciating this challenge, Simmons et al. (2013) suggested that studies include at least 50 participants per cell unless there is strong evidence that such a threshold is unnecessary to meet. Every study exceeded this threshold. Even using rigorous exclusion criteria[2] to screen out bots and participants who did not read the study materials carefully, we were left with an average of 196 participants per condition. Second, in all but Study 1, we had participants express their preferences across 5–25 trials. This allowed us to vary one of our factors of interest (whether risk components were spread or consolidated) within-participants, thereby allowing for more statistical power than would fully between-participants designs. Third, we focused on ex ante stopping rules. For online samples, we maximized sample sizes given available laboratory resources for online data collection for that

[2] At the conclusion of every study, we asked participants to complete a memory-based attention check. It was meant to verify that a participant was not merely responding randomly (as a bot or someone merely rushing through a study in order to maximize earnings might do). In four of our nine studies (including one of two reported in the Supplemental Materials), the central hypothesized effect was significantly attenuated among participants who failed the attention check (see Supplemental Materials). One such study was Study 4b, which had the highest exclusion rate (33%). Thus, in Study 6, we replicated and extended Study 4b, but recruited from a quality-curated participant pool. The exclusion rate dropped to 1%.

month. For laboratory samples, we recruited as many participants as were available in an undergraduate subject pool in a single semester. All materials, data, and analysis code are available online at https://osf.io/hbgy8/.

Study 1

Study 1 had two goals. First, we tested whether people prefer to consolidate (as opposed to spread) risks when such risks take a disjunctive (as opposed to a conjunctive) form. To do so, we had participants consider the experience of an entrepreneur searching for funding from potential investors. We varied whether one would need to secure the financial support of all potential investors one approaches (conjunctive risk) or only one of those investors (disjunctive risk) in order to achieve the necessary funding. Participants indicated a preference for *consolidating* efforts to focus on just a few investors or *spreading* one's efforts by trying to court a larger number of investors. Crucially, we made explicit—and reinforced through dynamic feedback—that the likelihood of success would not differ between the two approaches. Furthermore, we probed people's internalization of this key detail at the study's conclusion and used this as a (preregistered) basis of exclusion for our main analyses.

When people confront multicomponent risks in daily life, it is often not made explicit what each component's probability of success is. Consistent with this, Study 1 provided qualitative (instead of quantitative) information about the nature of these risks. This allowed us to understand people's preferences for consolidating disjunctive risks and spreading conjunctive risks independent of the mathematical challenges of calculating compound probabilities. Subsequent studies will complement this approach by supplying and/or measuring numerical probability estimates, thereby offering a different tradeoff between quantitative precision and more qualitatively natural presentation. For example, in the case of a conjunctive risk (in which all investors' involvement would be necessary), we explained that one could approach a small number of high-dollar investors (each of whom would be relatively less likely to invest) or a large number of low-dollar investors (each of whom would be relatively likely to invest). But in the case of the disjunctive risk (in which only one investor's partnership would be required), we said that approaching a small number of investors would permit more time to court each potential investor (thereby increasing the chance of success with each investor), whereas approaching a large number of investors would offer less time to try to win each one over (thereby decreasing the chance of success with each investor).

Second, we wanted to test whether any systematic preferences for consolidating or spreading risks would in part be explained by anticipated experience. Consistent with the idea that people would prospectively evaluate experiences by sampling individual slices in time (and thus neglecting the opportunities or limitations posed by the number of investors one would ultimately approach), we hypothesized that people would expect to feel more confidence (and possibly less anxiety) by spreading a conjunctive (vs. a disjunctive) risk. After all, spreading a conjunctive risk (and consolidating a disjunctive risk) does maximize one's chances for good news at any single moment in time. We, thus, expected anticipated experience to mediate the effects of risk (conjunctive or disjunctive) on preference for risk structure (spread or consolidated).

Method

Participants and Design

We recruited 173 Americans from Amazon Mechanical Turk (AMT). Participants were randomly assigned to one of two *risk* conditions: disjunctive or conjunctive. We preregistered our hypotheses, sample size, exclusion criteria, design, and analysis plan at https://aspredicted.org/s59nx.pdf.

Procedure and Materials

Participants were asked to consider being an entrepreneur who was in search of funding for a business venture from a group of angel investors. We noted that successfully funding the venture would require securing the investment of at least one (disjunctive risk condition) or all (conjunctive risk condition) of the investors one approached. We explained to participants that they had a choice of whether to approach a relatively large (thereby spreading) or small (thereby consolidating) number of investors. How this tradeoff was described is reproduced below. But crucially, in both conditions, we stated, "Overall, you don't think you have a better chance of getting funding from one approach or the other." As a result, we emphasized which approach participants would prefer to take "is just a matter of your preferences." We drew extra attention to this detail by: (a) quizzing participants on whether one approach would lead to a higher probability of success, (b) offering feedback, and then (c) reinforcing that neither approach offered a better chance of success. At that point, participants indicated their preference for consolidating or spreading, reported their anticipated experience from taking each approach, and then completed an item that we preregistered would be used to screen out participants who had not internalized the key instructions.

Disjunctive Risk. In the disjunctive risk condition, the entrepreneur's funding search would be successful if they got the support of at least one potential investor. The two strategies were described as follows:

Consolidate. You can focus on a relatively small number of investors, which will give you more time to talk with each investor. This means you will have few options from which to get a "Yes," but the chance that each investor will say "Yes" to your pitch is a bit higher.

Spread. You can focus on a relatively large number of investors, which will give you less time to talk with each investor. This means you will have a large number of options from which to get a "Yes," but the chance that each investor will say "Yes" is low.

Conjunctive Risk. In the conjunctive risk condition, participants learned they would need the support of every investor whom they approached. Again, we described how participants could choose to spread or consolidate that risk:

Consolidate. You can focus on a relatively small number of investors, asking each to contribute a relatively large amount of money. This means you will just need a few investors to all say "Yes," but the chance that each investor will reject your pitch is a bit higher.

Spread. You can focus on a relatively large number of investors, asking each to contribute a relatively small amount of money. This means you will need a large number of investors to all say "Yes," but the chance that each investor will reject your pitch is low.

Preference for Consolidating or Spreading Risk. A single item assessed participants' preference for spreading or consolidating: "In light of everything you know, which approach do you prefer?" (1 = *definitely prefer to consolidate*, 2 = *mostly prefer to consolidate*, 3 = *somewhat prefer to consolidate*, 4 = *prefer both equally*, 5 = *somewhat prefer to spread*, 6 = *mostly prefer to spread*, 7 = *definitely prefer to spread*).

Anticipated Experience. Next, participants were asked to report how much confidence and how much anxiety they would be experiencing as their meetings with the potential investors unfolded. Participants answered these questions twice: once under the assumption that they took the consolidated route, and once, the spread route. The responses were offered on 7-point scales anchored at 1 (*not confident/anxious at all*) and 7 (*very confident/anxious*). Which route participants rated first, as well as the sequencing of the confidence and anxiety measures, was counterbalanced.

Instructions Internalization Check. Finally, participants were asked whether they had a higher probability of success from consolidating their efforts into fewer investors, spreading them across more investors, or whether the two approaches were equiprobable. Per our preregistration, the 40 participants who did not select the correct answer were excluded from our analyses.

Results and Discussion

We first tested whether participants' preferences for consolidating (vs. spreading) differed by the nature of the risk. They did: Participants who considered confronting a conjunctive risk had a stronger preference to spread that risk ($M = 4.63$, $SD = 1.56$) than did participants who considered the disjunctive risk ($M = 3.43$, $SD = 1.68$), $t(131) = 4.20$, $p < .001$, $d = 0.73$ (see Figure 2). Although our preregistered analysis plan focused on this between-condition comparison, we performed two additional tests—preregistered as exploratory—to see whether those confronting conjunctive and disjunctive risks possessed an absolute (and not merely a relative) preference to spread or to consolidate, respectively. In comparisons against the neutral midpoint (4), we found that those considering a conjunctive risk displayed a significant preference for spreading, $t(58) = 3.08$, $p = .003$, $d = 0.40$, whereas those considering a disjunctive risk displayed a significant preference for consolidating, $t(73) = -2.91$, $p = .005$, $d = 0.34$.

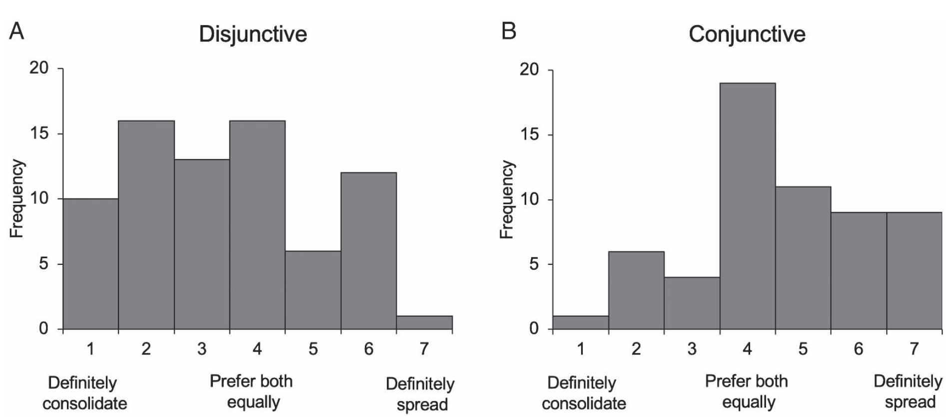
Especially given these analyses were performed on those who internalized that each approach was said to be equiprobable, we examined whether anticipated experience during the meetings themselves explained these patterns. To this end, we created two difference scores. One reflected how much more confidence participants anticipated experiencing if they took the spread route compared to (i.e., minus) the consolidated route. The other difference score was calculated the same way, but was for anticipated anxiety. Those who considered a conjunctive risk anticipated greater relative anticipated confidence from spreading ($M_{dif} = 0.59$, $SD = 1.73$) compared to those considering the disjunctive risk ($M_{dif} = -0.64$, $SD = 1.89$), $t(131) = 3.86$, $p < .001$, $d = 0.67$. Mirroring these results, participants who considered a conjunctive risk anticipated lower relative anticipated anxiety from spreading ($M_{dif} = -0.76$, $SD = 1.83$) than did those considering the disjunctive risk ($M_{dif} = 0.45$, $SD = 2.04$), $t(131) = 3.55$, $p < .001$, $d = 0.62$.

Finally, we asked whether anticipated confidence and/or anxiety mediated the effect of the risk manipulation on preference for spreading (vs. consolidating). We regressed the preference for spreading on risk (+1 = conjunctive, −1 = disjunctive), the anticipated confidence difference score, and the anticipated anxiety difference score. Anticipated confidence clearly predicted preferences, $\beta = 0.43$, $t(129) = 5.19$, $p < .001$. Anticipated anxiety's effects were weaker, but still significant, $\beta = -0.20$, $t(129) = -2.42$, $p = .017$. The effect of risk condition remained significant, $\beta = 0.15$, $t(129) = 2.04$, $p = .044$. In a parallel mediation model (Model 4, PROCESS Version 3.5; Hayes, 2017), the indirect effect through anticipated confidence was significant (95% CI [0.0813, 0.5110]), while the indirect effect through the anticipated anxiety was not (95% CI [−0.0494, 0.2592]).

In summary, despite being told that each approach offered the same prospects for success, participants displayed a preference for spreading a conjunctive risk and consolidating a disjunctive risk. These patterns were in part explained by the greater anticipated

Figure 2

Preferences to Spread or Consolidate Disjunctive and Conjunctive Risks (Study 1)



Note. The number of participants who stated each preference for approaching potential investors under conditions of disjunctive (Panel A) or conjunctive (Panel B) risk.

confidence that traversing those routes would afford. After all, the preferred routes would structure risks such that one's prospects for good news—at any individual moment in time—would be maximized. That said, one may wonder whether those in the disjunctive risk condition—those in which participants needed the involvement of "at least one" investor—may have thought that there would be added value in securing even more than the required one. If participants adopted this perspective, then this could have made the possibility of approaching more investors—thereby allowing one to go much over one's funding goal—seem particularly attractive. But this possibility would have worked *against* our hypothesis, which was that those considering the disjunctive risk would prefer to consolidate their efforts into just a small number of investors.

Similarly, although all participants who remained in our final analyses knew that the stated probability of success from spreading as opposed to consolidating would be the same, perhaps participants privately suspected that the probability of success with each investor would increase as they continued to talk to more investors (based on feedback they got from previous potential investors). If participants made this inference, note this would have made a spread disjunctive risk seem more attractive. That is, if one needed the support of only one (instead of all) investor(s), then spreading a disjunctive risk may offer more opportunities to benefit from learning. Again, any such tendency of participants to embrace this (unstated) logic would have worked *against* our hypotheses. More generally, concerns of this variety highlight the benefit of our next moving to a paradigm in which component probabilities of success are explicitly provided.

Study 2

Study 2 extended on Study 1 in three ways. First, Study 2 moved to a new context. Participants considered being a manager faced with a series of decisions about how much money to invest in (potentially) lucrative projects. The specifics of these projects were varied according to whether participants considered disjunctive or conjunctive risks.

Second, Study 2 included information that characterized the risk in terms of explicit probabilities. Study 1 offered such information in qualitative terms, so this feature of Study 2's serves as a robustness check. Third, Study 2 tested an implication of our myopia account that is not anticipated by an alternative account that focuses merely on systematic bias in probability estimation (e.g., anchoring). The myopia account suggests that a risk's possessing a multicomponent structure—one that can offer strong prospects for good news at individual moments in time—is crucial. Whereas some participants considered multicomponent risks, others considered single-component risks in which a risk was not decomposable into component parts and whose prospects of success were described only in aggregate terms. But crucially, and as our yoked procedure will make clear, these single-component risks had success probabilities that matched the perceived probability of overall success that participants ascribed to a matching multicomponent risk. This allowed us to disentangle biases in probability estimation (which would apply to both multicomponent risks and the yoked single-component risks) from preferences that would emerge due to the unique structure of multicomponent risks. We predicted that the relative preference to spread conjunctive (vs. consolidate disjunctive) multicomponent risks should attenuate when participants consider subjective-probability-matched single-component risks.

Method

Participants and Design

Eight hundred sixty-three Americans were recruited from AMT. Participants were randomly assigned to one of four conditions in a 2 (risk: disjunctive or conjunctive) × 2 (structure: multicomponent or single-component) full-factorial design. We preregistered our hypotheses, method, and analysis plan at https://aspredicted.org/vm9cu.pdf.[3]

Procedure

Participants considered being a manager who oversaw a number of employees and investment decisions. To begin, participants made a series of 25 *baseline probability* judgments that allowed us to assess—at the individual participant level—the perceived likelihood that different multicomponent prospects would yield overall successes. In all cases, participants were told that a particular employee could successfully complete a task *X*% of the time, and that "that probability is constant with time; it does not change with practice or fatigue." Disjunctive-risk participants indicated how likely the employee would be successful at least once in the next *Y* (2, 3, 4, 5, or 6) attempts. Conjunctive risk participants estimated the probability that the employee would be successful in all of the next *Y* (2, 3, 4, 5, or 6) attempts. Crucially, five of these 25 judgments—all of which described a scenario that actually offered a 50% chance of overall success—would later become relevant for the key dependent measures.

After providing these baseline judgments, participants were told they would consider a different question: how much they would be willing to invest in five different projects. For each project, all participants read "Your company actuaries are asking you to consider the most you would be willing to invest (under different assumptions) in this project that—if successful—will return $200,000." We emphasized that regardless of whether the project was a success or not, the initial investment would be lost. For each of the five projects, participants indicated—in an open-ended text box—how much they would be willing to invest in the project. However, crucially, the characteristics of the project varied according to whether participants were randomly assigned to consider a multicomponent or single-component risk structure.

Multicomponent Structure. Participants in the multicomponent structure condition were told the project had *Y* (2, 3, 4, 5, or 6)

[3] We deviated from the preregistration in two ways. First, we preregistered that we would use a final memory-based attention check to exclude participants. Only after running the study, we did see that participants in the disjunctive risk condition could have (and almost half did) reasonably offered a second answer. Because it would be inappropriate to use the screen to exclude participants in one condition and not the other, we present the results without exclusions in the main text. Second, two probability estimates exceeded 100%. Although we did not specify that we would excluded responses on this basis, we omitted these two responses in the analyses reported below. In the Supplemental Materials, we report the analyses that strictly follow the preregistered analysis plan. This had a small effect on two of seven tests. There, interested readers will find that one test that was not hypothesized to achieve statistical significance, but emerged as marginally significant ($p < .10$) in the analyses reported in the main text was no longer marginally significant; another test that was hypothesized to achieve statistical significance ($p < .05$), and did so in the analyses reported in the main text, became marginally significant ($p < .10$), despite the coefficient strengthening (but the sample size declining).

subtasks. The results from each subtask—whether it succeeded or failed—would be learned (via email) at the end of each subsequent day. Participants read that, "the probability that each email will indicate that the subtask was a success is *X*%," such that *X* was the percentage that—for the accompanying *Y*—would make the actual probability of overall success 50%. Participants in the disjunctive risk condition considered how, for the project to succeed, at least one of the *Y* subtasks needed to be a success; conversely, participants in the conjunctive risk condition considered how the project would be a success only if each of the *Y* subtasks was a success.

Single-Component Structure. Participants in the single-component structure condition also made five investment decisions, but in this case, no subtasks were referenced. Instead, participants were simply told they would receive an email in *Y* (i.e., 2, 3, 4, 5, or 6) days indicating whether the project was a success. Thus, instead of supplying probability information about components (given no such components were referenced), participants were provided with a probability of *overall* success. And crucially, that probability was the baseline probability judgment provided by *that particular participant* when they had previously judged the probability of success of the matched (baseline) multicomponent risk. Figure 3 summarizes the four conditions.

Results and Discussion

We wished to test whether the relative preference for consolidating (vs. spreading) disjunctive (as compared to conjunctive) risks would more clearly emerge for multicomponent risks than (yoked) single-component risks that were seen to have the same probability of overall success. The investment amounts were themselves positively skewed. We tested two transformations—square root and natural log—and found that the square-root transformation minimized skew. As a result, we conduct all analyses on these transformed values.

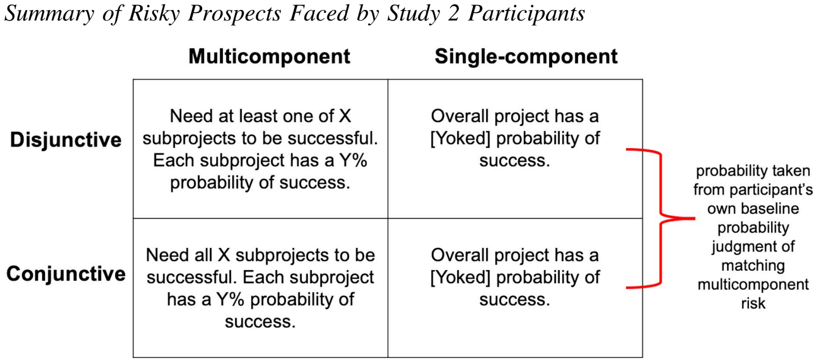
We predicted these investment amounts using a mixed model, which included a random effect of participant (to account for nonindependence across the participant's five decisions). The model included fixed effects of risk (+1 = conjunctive, −1 = disjunctive), structure (+1 = multicomponent, −1 = single-component), components (2–6, though recentered at 0), as well as the possible interaction terms. Finally, we included the relevant (standardized) baseline probability judgment that corresponded to each risk. This allowed us to account for participant-level variation in investment decisions that could be explained by individual variation in the perceived probability of overall project success.

Consistent with our central prediction, we observed a significantly positive Risk × Structure × Components interaction, $B = 1.22$, $SE = 0.57$, $t(3355.00) = 2.15$, $p = .031$. As Figure 4 depicts, when managers confronted a multicomponent risk structure—in which they anticipated receiving feedback about the success or failure of individual components at the end of each day—a significant Risk × Components interaction emerged, $B = 3.48$, $SE = 0.83$, $t(3364.55) = 4.18$, $p < .001$. This reflected that participants preferred both consolidating disjunctive risks, $B = -3.76$, $SE = 1.19$, $t(3356.75) = -3.15$, $p = .002$, and spreading conjunctive risks, $B = 3.20$, $SE = 1.15$, $t(3363.54) = 2.78$, $p = .005$. But when participants considered single-component risk structures—ones that explicitly offered the same (perceived) probability of success as their multicomponent counterparts—this Risk × Components interaction evaporated, $B = 1.04$, $SE = 0.78$, $t(3362.41) = 1.33$, $p = .183$. Without the risk unfolding across multiple components across time, participants displayed no preference for (in the probability-matched single-component risks) consolidating disjunctive risks, $B = -0.17$, $SE = 1.06$, $t < 1$, and only a marginal preference for spreading conjunctive risks, $B = 1.91$, $SE = 1.14$, $t(3365.14) = 1.67$, $p = .095$.

Study 2 leveraged the fact that (subjectively) equiprobable risks can take on a multicomponent or single-component structure. A multicomponent risk can allow decision makers to learn about the success (or failure) of individual component parts across different moments; a single-component risk—by merely reporting an overall success or failure—necessarily precludes this. Study 2 showed that risks' actual multicomponent structure is crucial to producing the preference for consolidating disjunctive and spreading conjunctive risks. That is, these preferences do not emerge simply due to the difficulty of (and systematic errors that may emerge when) trying to discern the probabilities of overall success. Instead, Study 2's results are consistent with our suggestion that when people prospectively evaluate the attractiveness of a conjunctive or disjunctive risk sequence, they lean on their feelings about how it will feel to traverse that sequence. Spreading conjunctive risks (and consolidating disjunctive risks) allows risk-takers to maximize their prospects for receiving favorable news at any one single moment in time. Single-component risks—given they are not decomposable into individual

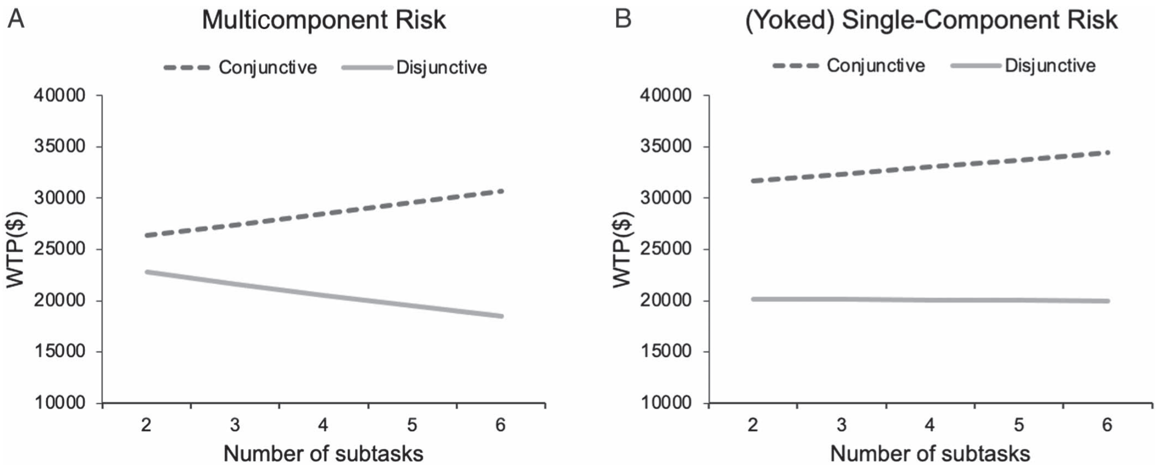
Figure 3

Summary of Risky Prospects Faced by Study 2 Participants



Note. Participants indicated the most they would be willing to invest to take a chance at a $200,000 payoff. Each participant faced five focal trials. See the online article for the color version of this figure.

Figure 4
Willingness to Pay (WTP) to Invest in the Project, by Risk, Structure, and Components (Study 2)



Note. When the risk had a multicomponent structure, the probability of each individual component (subtask) was provided to participants (A). When the risk had a (yoked) single-component structure, only the overall probability of a project's success—which came from the participant's own estimate of the same baseline multicomponent risk—was provided to participants (B).

moments to consider—cannot be evaluated by the same myopic evaluations of anticipated experience.

Study 3

As in Study 2, participants in Study 3 considered being a manager deciding how much to invest in various multicomponent projects. However, Study 3 extended our previous efforts in two ways. The first advance was the inclusion of additional items designed to probe participants' experiences as they considered multicomponent risks. Just as in Study 1, we included items designed to measure *anticipated* anxiety and confidence. These items assessed participants' forecasts about how they would feel as they traversed through the multicomponent sequence. However, we also included additional items that assessed participants' *anticipatory* anxiety and confidence—the sense of discomfort experienced in the moment while prospectively contemplating the risk, not the feelings one anticipates experiencing as the risk unfolds—that might also influence participants' risk preferences. After all, anticipatory emotions sometimes trump anticipated ones in predicting behavioral expectations (Carrera et al., 2012), including those in risky decision-making (Schlösser et al., 2013).

The second advance was more crucial. To this point, we have examined conjunctive and disjunctive risks described in terms of potential gains. Though consider Study 2, which described what were essentially mixed gambles, those that offered the chance of a gain (an investment return) or a loss (one's initial investment). Study 3 took advantage of the fact that a gain-outcome conjunctive or disjunctive risk can actually be redescribed as a loss-outcome disjunctive or conjunctive risk, respectively. For example, a gain-outcome disjunctive risk (that has two components that each have a 29.3% chance of succeeding) can be equivalent to a loss-outcome conjunctive risk (that has two components that each have a 70.7% chance of failing). Gain-outcome conjunctive risks can be similarly reframed as loss-outcome disjunctive risks.

By our myopia account, people evaluate the attractiveness of multicomponent risks via a narrow evaluative emphasis, in which the anticipated feeling of proceeding through a set of components is myopically determined by how one would expect to feel at single snapshots in time. This logic predicts that when gain-outcome multicomponent risks are reframed as loss-outcome multicomponent risks, we should instead see a preference for spreading disjunctive risks and consolidating conjunctive risks. This reversal would reflect a continued interest in minimizing the likelihood that any one component is likely to deliver bad news. Furthermore, we predict that these preferences will be explained by the experiential mediators, above and beyond participants' beliefs that the multicomponent risks will yield successful outcomes. If instead there is simply an unconditional preference for spreading conjunctive risks across more components and consolidating disjunctive risks into fewer ones, then the predicted reversal should not emerge.

Method

Participants and Design

One thousand forty-three Americans were recruited from AMT. Participants were randomly assigned to one of four conditions in a 2 (risk: conjunctive or disjunctive) × 2 (outcome: gain or loss) full-factorial design. We preregistered our hypotheses, methods, exclusion criteria, and analysis plan at https://aspredicted.org/qa9yc.pdf. Two hundred one participants failed a preregistered memory-based attention check and were excluded from all analyses reported below.

Procedure

Much like in Study 2, participants were asked to consider being a manager. In this case, participants began by making 10 baseline probability judgments. At that point, participants considered five multicomponent risks that varied in terms of whether they involved 2, 3, 4, 5, or 6 components. Whether these baseline probability judgments and risks took a conjunctive or disjunctive form, and whether they were written to describe the conditions needed for a gain (of $200,000) or a loss (of one's initial investment), varied by condition. For each multicomponent risk, participants indicated how much they would be willing to invest in the project, as well as their anticipated and their anticipatory experience. We describe these features and measures in more detail below.

Baseline Probability Judgments. In each of ten cases, participants were asked to imagine that an employee "can successfully complete" (gain-outcome condition) or "fails to successfully complete" (loss-outcome condition) a task X% or $(100 - X)$% of the time, respectively. We emphasized that this probability is "constant with time," and would not change "with practice or fatigue." Participants then estimated how likely the employee would be to "successfully complete it" (gain-outcome condition) or "fail to complete it" (loss-outcome condition) on each (conjunctive risk condition) or at least one (disjunctive risk condition) of the next Y attempts. Y varied from 2 to 6, inclusive. Crucially, five of these 10 judgments matched the multicomponent risks for which participants would later offer investment decisions and indicate their anticipated and anticipatory experiential reactions. And, as was the case in Study 2, each of those five judgments described an investment context in which the overall probability of success (and failure) was 50%. The remaining five contexts were fillers.

Multicomponent Risks. At that point, participants learned that the company's actuaries had formulated five different possible investment opportunities. These opportunities varied in their number of components (from 2 to 6). The gain-outcome risks took the same form as the multicomponent risks in Study 2, describing the conditions under which the $200,000 investment would be achieved. The loss-outcome risks were objectively equivalent, but described the conditions under which the investment would fail, meaning the initial funding would be lost. For the five focal trials, the objective probability of overall success was 50%, regardless of whether the described outcome was a gain or loss, and regardless of whether the risk was described in conjunctive or disjunctive terms.

In this way, a loss-outcome conjunctive (or disjunctive) risk was simply a reframing of the gain-outcome disjunctive (or conjunctive) risk. As one example, the two-component, gain-outcome disjunctive risk was said to require at least one of two subtasks—each of which had a 29.3% chance of success—to actually succeed. Adopting a different frame but describing the same risk, the two-component, loss-outcome conjunctive risk noted that if both of two subtasks failed—each of which has a 70.7% chance of failure—then the project as a whole would fail. Participants considered the five investment opportunities in a random order.

Investment Decision. For each investment decision, participants responded to the prompt "What is the most amount of money you would be willing to invest?" It was required that participants type a response under $200,000. These responses displayed significant positive skew. Whereas a log-transformation introduced negative skew, a square-root transformation perfectly eliminated skew. All analyses were, thus, conducted on square-root-transformed data.

Anticipated Experience. Participants completed two anticipated experience items that asked participants to estimate how they would feel proceeding through the risk. The confidence and anxiety measures took a similar form: "As you think about the project actually unfolding, how much [confidence; anxiety] would you be feeling?" Each measure was completed on an unnumbered slider scale with (the numerically hidden) anchors of 0 (*not at all*) and 100 (*very much*). The slider's default value was the midpoint (50).

Anticipatory Experience. These items instead asked participants how they felt now thinking prospectively about investing in the project. The confidence and anxiety measures again took a similar form: "As you think about investing in the project, how much [confidence; anxiety] does it inspire?" These 101-point slider scales took the same form.

Results and Discussion

We proceed in three steps. First, we analyze the investment decisions to test whether the preference for consolidating disjunctive risks and spreading conjunctive risks reverses when those risks describe possible losses. Second, we test whether these same patterns apply to anticipated and anticipatory experience. Third, we examine the possibility that these experiential measures statistically explain the effects of our risk and outcome manipulations on investment decisions.

Investment Decisions

We predicted the (transformed) investment amounts using a mixed model. The model included fixed effects of risk (+1 = conjunctive and −1 = disjunctive), outcome (+1 = gain, −1 = loss), and components (2–6, recentered at 0). We also included the possible interaction terms. In addition, we included the matching baseline probability judgments, so we could probe variation in investment decisions that was not simply attributable to the perceived probability of overall success. We reverse-scored the probability judgments collected in the loss-outcome conditions, given those were elicited to describe the perceived probability of a failure. Finally, we included a random effect of participant (to account for nonindependence across the participant's five decisions).

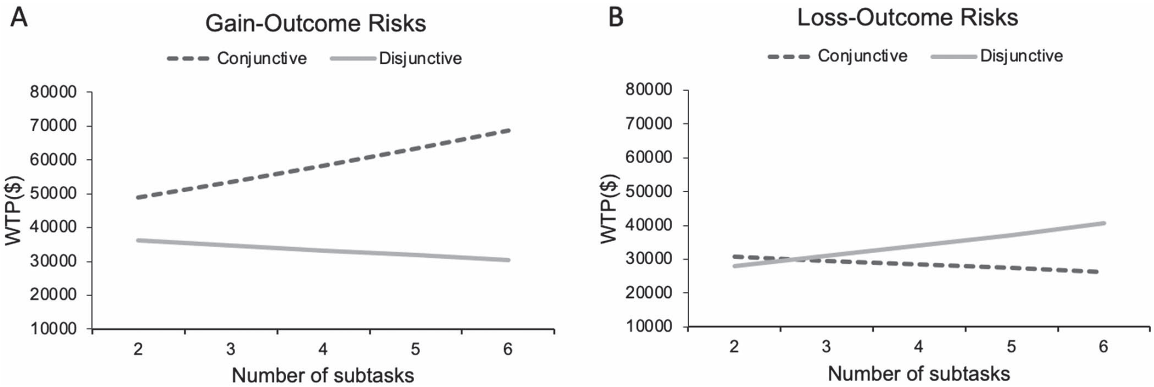
Unsurprisingly, we observed a clear effect of perceived probability, $B = 9.03$, $SE = 2.03$ $t(4086.06) = 4.44$, $p < .001$. Independent of these beliefs about how likely the multicomponent risks were to yield an overall success, we observed a significantly positive Risk × Outcome × Components interaction, $B = 6.52$, $SE = 0.62$, $t(3408.10) = 10.55$, $p < .001$. Unpacking this central effect yields clear support for our hypotheses (see Figure 5).

Gain-Outcome Risks. When participants made investment decisions described in terms of what criteria would produce a gain (of $200,000), a positive Risk × Components interaction emerged, $B = 7.13$, $SE = 0.84$, $t(3392.66) = 8.46$, $p < .001$. This positive interaction describes a familiar pattern. When facing conjunctive risks, participants were enticed by prospects that were spread across more components, $B = 10.30$, $SE = 1.17$, $t(3380.80) = 8.80$, $p < .001$. But when considering disjunctive risks, participants were instead willing to invest more in multicomponent risks consolidated into fewer components, $B = −3.97$, $SE = 1.19$, $t(3374.92) = −3.32$, $p < .001$.

Loss-Outcome Risks. When participants instead considered the same set of risky investments, but described in terms of what would produce a failure and thus a loss of one's initial investment, a *negative* Risk × Components interaction emerged, $B = −5.90$, $SE = 0.88$, $t(3380.04) = −6.70$, $p < .001$. This reversal demonstrates that there is not simply an unconditional association between conjunctive and disjunctive risks and a preference for spreading and consolidating.

Figure 5

Willingness to Pay (WTP) to Invest in the Project, by Risk, Outcome, and Components (Study 3)



Note. When the risk was gain-outcome framed, participants considered conjunctive or disjunctive multicomponent risks described in terms of potential successes (A). When the risk was loss-outcome framed, participants considered conjunctive or disjunctive multicomponent risks described in terms of potential failures (B).

For these loss-outcome risks, participants displayed a preference for *consolidating* conjunctive risks, $B = -3.30$, $SE = 1.27$, $t(3365.97) = -2.61$, $p = .009$. They instead invested more in *spread* disjunctive risks, $B = 8.51$, $SE = 1.21$, $t(3379.01) = 7.01$, $p < .001$. This reversal is consistent with our theorizing. Consolidating gain-outcome disjunctive risks and loss-outcome conjunctive risks, and spreading gain-outcome conjunctive risks and loss-outcome disjunctive risks, maximizes the possibility that one will, along every step of the way (regardless of its length), receive positive (or not negative) news.

Experience Measures

We proceeded to test whether the anticipated and/or anticipatory experience measures would show the same pattern. We used the same model as that predicting investment decisions, but instead predicted each of the four experience measures. Crucially, these models included baseline probability judgments as a covariate. The key tests from the model are summarized in text. The second column of Table 1 shows how spreading (vs. consolidating) influenced the experience measures in each condition.

Anticipated Experience. When predicting anticipated confidence, we observed a robust Risk × Outcome × Components interaction, $B = 1.47$, $SE = 0.16$, $t(3429.30) = 9.10$, $p < .001$. By contrast, the model predicting anticipated anxiety revealed a weaker, marginally significant three-way interaction, $B = -0.30$, $SE = 0.16$, $t(3442.69) = -1.85$, $p = .065$. Table 1 shows that in all four conditions, spreading or consolidating influenced anticipated confidence. In only one condition was anticipated anxiety affected.

Anticipatory Experience. When predicting anticipatory confidence, we also observed a significant Risk × Outcome × Components interaction, $B = 1.23$, $SE = 0.15$, $t(3423.60) = 8.10$, $p < .001$. In contrast, there was a marginally significant three-way interaction when predicting anticipatory anxiety, $B = -0.26$, $SE = 0.15$, $t(3435.16) = -1.75$, $p = .080$. As can be seen in Table 1, in three of four conditions spreading or consolidating significantly affected anticipatory confidence. In only one condition was anticipatory anxiety influenced.

Connecting Anticipated and Anticipatory Experience With the Investment Decision. We returned to our original model that predicted the investment decision, but added in the four experience measures as additional predictors. Here, anticipated confidence positively predicted participants' valuations of each of the investment decisions, $B = 0.66$, $SE = 0.07$, $t(3656.36) = 9.15$, $p < .001$. The relationship between participants' anticipated anxiety and their willingness to pay for each of the investments was weaker, $B = 0.19$, $SE = 0.07$, $t(3620.65) = 2.71$, $p = .007$, and surprisingly positive. The anticipatory experience measures followed a similar pattern. The more confidence participants felt when contemplating traversing a multicomponent risk, the more they were willing to invest in that risk. $B = 0.74$, $SE = 0.08$, $t(3742.22) = 9.80$, $p < .001$. The relationship between anticipatory anxiety and willingness to invest was not significant, $B = 0.12$, $SE = 0.07$, $t(3717.42) = 1.54$, $p = .124$, and again actually positive. In this full model, the Risk × Outcome × Components interaction was significant, $B = 4.69$, $SE = 0.60$, $t(3435.01) = 7.86$, $p < .001$, but diminished in magnitude.

The strong predictive power of the anticipated and anticipatory confidence measures speaks to how participants' confidence—both as they prospectively imagined traversing the multicomponent sequence and as they contemplated taking on the risk itself, and independent of the perceived probability of overall success—were closely tethered to participants' valuations of the investment opportunities. That the anticipated and anticipatory anxiety measures possessed (sometimes significant) *positive* coefficients—instead of the negative ones that would be consistent with their mediating the (marginally significant) three-way interactions predicting the investment decisions—is not consistent with their being meaningful mediators of the originally documented effect. In combination, this reinforces the finding in Study 1 that (expected) feelings of confidence, more than anxiety, seem to explain people's preferences for spreading or consolidating multicomponent risks. That the three-way interaction remained significant suggests either that other aspects of anticipated and/or anticipatory experience or other unconsidered mechanisms could contribute to people's multicomponent risk preferences. The imprecision of the experiential measures themselves could also be to blame.

Table 1
Summary of Mediation-Related Models, by Outcome-Risk Condition (Study 3)

Outcome-risk condition	Components → Mediators		Mediators → Investment	
Possible mediators	*B* (*SE*)	*t*	*B* (*SE*)	*t*
Gain-focused conjunctive				
Anticipated confidence	2.063 (0.307)	6.72***	0.760 (0.144)	5.29***
Anticipatory confidence	1.872 (0.289)	6.48***	0.604 (0.150)	4.03***
Anticipated anxiety	−0.891 (0.306)	−2.91**	0.100 (0.145)	0.69
Anticipatory anxiety	−0.630 (0.287)	−2.19*	−0.123 (0.155)	−0.79
Baseline probability judgments	0.083 (0.009)	9.10***	11.547 (4.817)	2.40*
Gain-focused disjunctive				
Anticipated confidence	−1.146 (0.313)	−3.66***	0.519 (0.147)	3.53***
Anticipatory confidence	−1.435 (0.295)	−4.87***	1.075 (0.161)	6.70***
Anticipated anxiety	−0.246 (0.312)	−0.79	0.529 (0.142)	3.72***
Anticipatory anxiety	0.508 (0.293)	1.73	0.200 (0.148)	1.35
Baseline probability judgments	−0.070 (0.009)	−7.50***	10.094 (3.942)	2.56*
Loss-focused conjunctive				
Anticipated confidence	−1.212 (0.332)	−3.65***	0.597 (0.130)	4.59***
Anticipatory confidence	−0.370 (0.313)	−1.18	0.622 (0.134)	4.67***
Anticipated anxiety	0.049 (0.331)	0.15	0.162 (0.137)	1.19
Anticipatory anxiety	−0.272 (0.311)	−0.87	−0.021 (0.137)	−0.15
Baseline probability judgments	−0.041 (0.001)	−4.08***	7.525 (3.541)	2.13*
Loss-focused disjunctive				
Anticipated confidence	1.467 (0.318)	4.61***	0.797 (0.157)	5.07***
Anticipatory confidence	1.261 (0.300)	4.21***	0.657 (0.158)	4.17***
Anticipated anxiety	−0.498 (0.317)	−1.57	−0.058 (0.147)	−0.39
Anticipatory anxiety	−0.192 (0.298)	−0.64	0.384 (0.157)	2.45*
Baseline probability judgments	0.082 (0.010)	8.64***	3.574 (3.537)	1.01

Note. The coefficients, standard errors, and accompanying *t* statistics come from the model described in that column. For "Components → Mediators," these reflect the effect of the number of components on the potential mediator in that row for a specific outcome-risk condition. All such models include the baseline probability judgment as the dependent measure of interest or as a covariate. For "Mediators → Investment," the five terms are simultaneous predictors of the investment decision. For this model, the data were subsetted to include only participants in that specific combination of outcome and risk condition; the number of components was included as a covariate. *SE* = standard error.
* $p < .05$. ** $p < .01$. *** $p < .001$.

Summary

When participants in Study 3 encountered multicomponent risks that were described in terms of potential gains, we replicated the result found in Studies 1 and 2: Participants preferred to spread conjunctive risks and consolidate disjunctive risks. Notably, this pattern reversed when participants considered investing in risks that were described in terms of the possible *negative* outcomes. This reversal is anticipated by our myopia account. If one considers the attractiveness of a multicomponent risk by assessing how it would feel to play out each component (without sufficient sensitivity to how the number of components contributes to one's overall experience and ultimate prospects for success), then this reversal should emerge. And indeed, these preferences were explained by anticipated (and also anticipatory) confidence, even controlling for the perceived probability of overall success.

Studies 4a and 4b

The first three studies demonstrated that people prefer to spread or consolidate multicomponent risks in ways that produce more confidence-inspiring, but myopically formulated evaluations. To this point, spread or consolidated multicomponent risks have also been spread or consolidated in time. But if this link were severed, then the myopia account—which focuses on how multicomponent risks would be resolved across different moments—anticipates predictable shifts in these preferences. Whereas Study 2 demonstrated that the multicomponent nature of a risk is critical, Studies 4a and 4b will identify the temporal spread or consolidation of the components as a crucial contributor to risk-takers' preferences.

To understand the general logic of these studies, consider a brief anecdote. In a typical state-sanctioned lottery (e.g., Powerball), the jackpot is split among any ticket holders who guessed *every* number that is drawn. It is a classic multicomponent, conjunctive risk. In college, the last author had not only a habit of buying a weekly Powerball ticket, but also a (to his then-roommate) curious habit of how he would look up the results. When accessing the six winning numbers from the lottery website, he would put his hand in front of the screen so he would not see all the numbers at once. Instead, he would slowly reveal the numbers one at a time, checking whether each newly visible number was on his ticket. After all, he knew that if he simply looked to see if the six numbers on the screen matched the six on his ticket, he was almost certain to lose. But if instead he checked only one number at a time, he felt much more confident that the next number would be a match. Rationally, he knew that this temporal spreading did nothing to enhance his chances to win. But this gradual, bit-by-bit approach—with its myopic focus on individual moments—inspired more confidence than an all-at-once scan of the winning numbers.

In Studies 4a and 4b, participants considered how much they would be willing to pay to play different die-rolling lotteries. When the game took the form of a disjunctive risk (Study 4a), a win required that only one of the dice land on a winning number. When the game reflected a conjunctive risk (Study 4b), a win would be achieved only if every die displayed an acceptable number. We varied the number of components (i.e., dice) while holding the objective probability of overall success constant.

We were interested in testing the logic of the myopia account. As such, both Studies 4a and 4b also manipulated the timing of how the die game would unfold. Some participants learned that it would proceed *sequentially*, with each die rolled one at a time. This preserves a feature present in the earlier studies: As more components were added to the multicomponent risk, the time course over which that risk would unfold increased as well. But for other participants, they were told the die rolls would occur *simultaneously*, with each die rolled at the same time. This prevents spreading or consolidating the multicomponent risks across more or fewer components from affecting individual moments of the risk's resolution. Though crucially, this (sequential or simultaneous) process manipulation preserves the mathematical challenge of determining the multicomponent risk's likelihood of overall success.

Before proceeding to the methods, consider how these hypotheses take a qualitatively new approach to the study of the time course over which people prefer to resolve uncertainty. As one point of contrast, some research has examined how people differ in whether they would like to prolong uncertainty or resolve it quickly. In some cases, people display an interest in waiting; most would rather not know what they will get for Christmas or when they will die (Gigerenzer & Garcia-Retamero, 2017). On the other hand, impatient test-takers have been charged a fee to learn their standardized test scores early by phone. It is certainly possible that multicomponent risk-takers might have an overall preference for resolving uncertainty slowly (in sequence) or quickly (all at once). But we do not examine timing in an effort to probe such a main effect. Instead, we vary timing as an experimental tool to probe the validity of our myopia account over and above an anchoring account that attributes such preferences only to the challenge of estimating the probability of an overall success from the probability that individual components will yield good news.

Study 4a: Method

Participants and Design

We used AMT to recruit 282 Americans, who took part in the study in exchange for nominal payment. Participants were randomly assigned to either the *simultaneous* or *sequential* process condition. Seventy-four participants failed a memory-based attention check that asked how the game would be played. Correct answerers indicated either that they "would roll up to 6 dice one at one time" (*sequential* condition) or that they "would roll between 2 and 6 dice all at once" (*simultaneous* condition). Excluding them left 208 participants in all analyses reported below.

Procedure

Participants learned they would play 25 rounds of a gambling game. For each round, participants would receive 2, 3, 4, 5, or 6 dice. Each die was unique, possessing a different color. At the start of each round, participants received information about which numbers were *winning* versus *forbidden* for each die. The round would be won with a single *winning* die (see Figure 6). Although the reverse frame was not made explicit, this meant participants lost only if they threw no winners (and solely forbidden numbers). The 25 trials were presented in a random order. The versions were created by fully crossing the number of dice (2, 3, 4, 5, or 6) and the probability of winning (approximately .67, .75, .78, .83, and .89; see Supplemental Materials Appendix A).

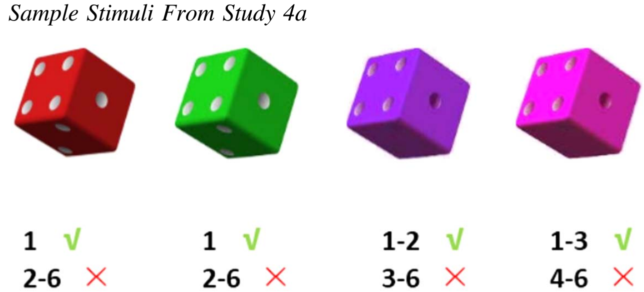
The only feature that varied between the two conditions was how the dice would be thrown. In the *sequential* process condition, participants were told they would roll the dice one after another, thereby allowing the component outcomes to be revealed across time. In the *simultaneous* process condition, participants were told they would roll all the dice at once. Knowing that a win was worth \$10, participants indicated the most they would be willing to pay (an amount that would be forfeited regardless of whether participants won or lost, what we called a "dice fee") to play the gamble.

Study 4a: Results and Discussion

Given participants confronted a disjunctive risk, we predict they would show a preference for consolidating (as opposed to spreading) that risk into fewer events. To test this hypothesis, we started by constructing a simple mixed model that included two fixed effects: number of *dice* (2 to 6, though centered at 0) and win *probability* (also coded from −2 to +2 in single-unit increments). To account for the nonindependence of each participant's 25 responses, we included a random effect of participant. Finally, to attenuate positive skew in participants' self-reported willingness to pay for each lottery, we tested whether a square-root or natural-log transformation better eliminated skew. The latter did and was applied.

Unsurprisingly, we observed a large positive main effect of probability, $B = 0.051$, $SE = 0.003$, $t(4990) = 15.85$, $p < .001$. Participants were willing not only to pay more when the actual chances of success were higher, but also to pay more to consolidate this risk into fewer dice, $B = -0.019$, $SE = 0.003$, $t(4990) = -6.10$, $p < .001$. Does this merely reflect participants' being unaware of how to calculate disjunctive risks, or instead do they show a predictable attenuation in their preference for consolidating the

Figure 6
Sample Stimuli From Study 4a



Note. In this version of the lottery, there are four components (dice). For the red, green, purple, and pink dice, the numbers 1, 1, 1–2, and 1–3 are *winners*, whereas the numbers 2–6, 2–6, 3–6, and 4–6 are *forbidden*, respectively. See the online article for the color version of this figure.

risk into fewer components when the multicomponent risk would play out all at once?

We proceeded by adding our *process* manipulation (sequential: −1 and simultaneous: +1) as another fixed effect to the model. Crucially, we also included all possible interaction terms that can be made from the three factors. Of key relevance is the Process × Dice interaction (see Figure 7A), $B = 0.007$, $SE = 0.003$, $t(4986) = 2.33$, $p = .020$. This positive coefficient suggests that participants' preference for consolidating disjunctive risk is especially strong when the events unfold sequentially: $B = -0.027$. But when the die rolls would all occur at a single moment (i.e., a single throw), participants became less sensitive to how many component dice there were: $B = -0.013$. After all, when the dice are thrown simultaneously, consolidating the risk into fewer components does nothing to enhance the likelihood of a win at any single point in time during the risk's unfolding. Only the myopia account anticipates this moderation.

Study 4b: Method

Participants and Design

A total of 436 Americans recruited via AMT took part in this study. Each participant was randomly assigned to one of two *process* conditions: sequential or simultaneous. One hundred forty-five participants were excluded from all analyses based on the memory-based attention check. They were unable to indicate either that they "would roll up to 6 dice one at a time" (*sequential* condition) or that they "would roll between 2 and 6 dice at once" (*simultaneous* condition). This left 291 participants in all analyses reported below.

Procedure

Participants learned they would price 25 rounds of a game. The game was similar to the one described in Study 4a, but in this case the relevant numbers for each die were labeled *acceptable* or *forbidden*. Participants would win if only acceptable (and no forbidden) numbers were rolled. And like before, participants learned that they would play the game by throwing the dice one at a time (*sequential* condition) or all at once (*simultaneous* condition).

To keep the probability of winning these conjunctive lotteries from being too low, we also modified which numbers were and were not acceptable numbers (see Supplemental Materials Appendix B). Finally, we increased the amount that could be won on each game from \$10 to \$50. We took this step because the objective probabilities of winning were lower, given one needs to roll acceptable numbers for all dice. That is, the win probabilities were approximately .11, .17, .22, .27, and .33.

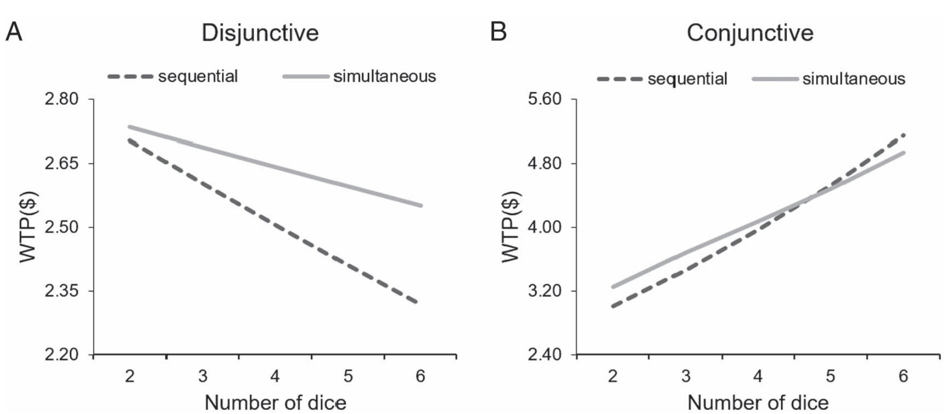
Study 4b: Results and Discussion

We followed a similar analytic approach to that used in Study 4a. To begin, we used number of *dice* (coded from −2 to +2) and win *probability* (coded from −2 to +2) to predict (log-transformed) willingness to pay. We also included participant as a random effect. Reflecting that valuations were sensitive to the true probability of winning the game, we observed a strong positive effect of probability, $B = 0.076$, $SE = 0.004$, $t(6982) = 20.69$, $p < .001$. But in this case, there was a *positive* effect for the number of dice, $B = 0.089$, $SE = 0.004$, $t(6982) = 24.29$, $p < .001$. This is opposite of what we observed in Study 4a, for this displays a preference for spreading (rather than consolidating) conjunctive risks across more components.

Our next model, which incorporated the *process* manipulation (sequential: −1 and simultaneous: +1), tested an implication of the myopia account in particular. In doing so, we can make sure that the preference for spreading does not merely reflect participants' anchoring on the component probabilities (given those are constant across process conditions) when assessing the overall probability of success. Using the same model specification as we did in Study 4a, we observed the critical Price × Dice interaction (see Figure 7B), $B = -0.014$, $SE = 0.004$, $t(6978) = -3.71$, $p < .001$. That this coefficient is negative shows that participants' preference for spreading conjunctive risks is attenuated when spreading the events across time is no longer possible (because all die rolls occur simultaneously). When spreading a risk across more components

Figure 7

Willingness to Pay (WTP) for the Lottery, by Components (Dice) and Process



Note. In Study 4a, the lottery was a *disjunctive* risk, and a win was worth \$10 (A). In Study 4b, the lottery was a *conjunctive* risk, and a win was worth \$50 (B). All predicted log-transformed means were backtransformed so they appear on the original scale.

(dice) also allows them to be spread across time (*sequential* condition), participants were clearly willing to pay more to spread the risk across more dice: $B = 0.106$. But when spreading the risk across components would not also allow them to spread those components across time (*simultaneous* condition), the preference for spreading was reduced: $B = 0.078$.

Study 5

Our final two studies had slightly different goals. But because one interest was in replicating the findings of Studies 4a and 4b, we had Studies 5 and 6 examine risks of two different types. Study 5 probes the myopia account more deeply in the context of disjunctive risks. But more specifically, we unconfounded the time course over which the risk actually unfolded from the time course over which the risk's outcomes would be revealed.

This design allowed us to address an alternative explanation for Study 4a. Perhaps participants were sensitive to the sequential unfolding of die rolls not because of the implications for the time course over which feedback would be received, but because this sequential resolution enhanced the visualizability (and thus salience) of each component and its likelihood of success. That is, when each component actually occurs in sequence, and thus in isolation, then this may draw attention to just how probable (and easy to imagine) or improbable (and thus difficult to imagine) each die roll's return of a winning number would be. This could explain why the aversion to spreading disjunctive risks is magnified when these low-probability components are played out separately in sequence.

We were skeptical of this alternative account for two reasons. First, if this mechanism were sufficient to account for our effects, then it is unlikely that Study 2 would have found a stronger preference to spread conjunctive (or consolidate disjunctive) risks in the multicomponent compared to the yoked single-component risks. That is, the single-component risks' stated probabilities of success were themselves determined by the perceived probability of success of matching multicomponent risks (to which this visualization mechanism would apply). Second, if this visualization mechanism contributes to our effects, it would anticipate an additional pattern in Study 4a: Participants should have been more sensitive to the *objective* probabilities of the multicomponent risks when they unfolded sequentially as opposed to simultaneously. After all, objective shifts in the multicomponent risks' probabilities (holding the total number of components constant) were instantiated through shifts in the probabilities that each component would be a winner. If anything, Study 4a participants who were told the dice would be rolled sequentially were actually *less* sensitive to the objective probabilities ($B = 0.041$, $t = 8.74$, $p < .001$) than those told the dice would be rolled simultaneously ($B = 0.059$, $t = 13.60$, $p < .001$). This pattern is not consistent with the operation of the alternative mechanism.

Study 5 further addresses this concern by holding constant the process by which the die game would unfold; the dice would always be rolled sequentially. But what we varied was how the outcomes of the rolls would be revealed. For some participants, the die rolls would be visible *immediately*. For other participants, this revelation would be *delayed*, disclosed only after all dice were rolled. Note that, just as in Studies 4a and 4b, this manipulation does not change the mathematical difficulty of calculating the true likelihood of winning the game.

Given Study 5 returned to Study 4a's disjunctive-risk paradigm, consider what different patterns of results would mean for our understanding of multicomponent risk preferences. If those weighing disjunctive risks are merely sensitive to the means by which the random events are determined, then their preference for consolidation should be equivalent in both conditions (given the dice are to be rolled sequentially in both cases). If instead disjunctive risk-takers are interested in consolidating risks so that they maximize the chance of good news *at single moments in time*, then myopic decision makers' interest in consolidating disjunctive risks into fewer components should clearly emerge when news of component success will be revealed sequentially. But if the component outcomes will be revealed all at once after a delay, then it should matter less how many individual components compose the risk.

Method

Participants and Design

Three hundred thirty-two Americans were recruited from AMT. They were randomly assigned to one of two *reveal* conditions: immediate or delayed. Seventy-nine participants failed a memory-based attention check: They were unable to remember that the gambling game would have them "roll up to 6 dice one die at a time." This left 253 participants in all analyses reported below.

Procedure

Participants considered a disjunctive-risk dice game, much like that used in Study 4a. That is, participants would win only if they threw at least one winning number. (Although we did not use the loss-outcome frame, this also means they would lose only if all of the 2, 3, 4, 5, or 6 dice they threw were forbidden numbers.) In this case, all participants learned that playing the game would entail throwing the dice one at a time. All that varied between the two reveal conditions was whether participants would learn the outcome of each die roll immediately after throwing it (*immediate* reveal) or only once all dice were thrown (*delayed* reveal). The 25 variants of the game were presented in a random order. Participants indicated the most they would be willing to pay to play each round, assuming a win would net them \$10.

Results and Discussion

We began by testing whether participants showed an overall preference for consolidating disjunctive risks. In the first model predicting (log-transformed) willingness to pay, we included only two fixed effects: the number of *dice* and win *probability*. To account for nonindependence, we included a random effect of participant. Suggesting participants were sensitive to variation in their true likelihood of winning, we observed a positive main effect of probability, $B = 0.051$, $SE = 0.003$, $t(6069) = 19.13$, $p < .001$. But in this case, we did not observe a negative main effect of dice number, $B = -0.003$, $SE = 0.003$, $t(6069) = -1.17$, $p = .241$.

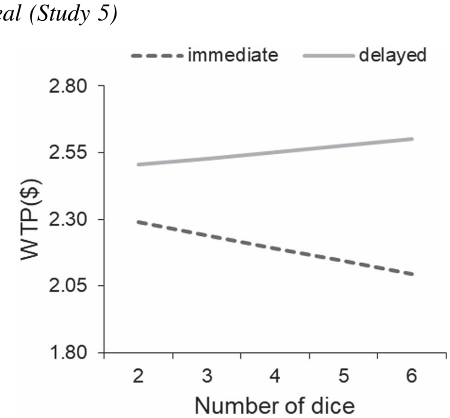
Next, we added the reveal manipulation as a fixed effect (−1: immediate and +1: delayed), as well as all possible interaction terms including the fixed effects. As expected, we found a Reveal × Dice interaction, $B = 0.011$, $SE = 0.003$, $t(6065) = 4.10$, $p < .001$. The positive coefficient reflects that participants preferred to consolidate a disjunctive risk *only* when that risk was not already temporally consolidated (to a single reveal). When the outcome of multiple events would be revealed one at a time, participants preferred to consolidate those into fewer events (and thus fewer reveals), $B = -0.015$, $SE = 0.004$, $t(6065) = -3.81$, $p < .001$. But when the outcome would be revealed in a single period (at the conclusion of the die rolls), participants no longer showed a preference for consolidation, $B = 0.007$, $SE = 0.004$, $t(6065) = 1.91$, $p = .056$ (Figure 8).

These results suggest the preference for consolidating disjunctive risks does not depend simply on how a risky event's outcomes unfold (and the greater focus on individual component probabilities that it might entail), but instead on how they are revealed. This finding is consistent with the myopia account, which identifies consolidating a disjunctive risk into fewer components as desirable when it helps to avoid prolonging the prospects for good news into a longer series of lower-success-probability reveals. When the component news will be revealed all at once, the myopically determined benefits of consolidating the risk into fewer components are reduced.

Study 6

Study 6 offers new features while also connecting several aspects of our preceding studies in order to provide a final, comprehensive test of our account. This final study thus proceeded with four goals. First, we had participants consider a subset of the mixed lotteries used in Study 4b, but instead of framing them as gain-outcome conjunctive risks, we framed them as logically equivalent loss-outcome disjunctive risks. We predicted that this would explain the interest in spreading (loss-focused) disjunctive risks that would be attenuated when the multiple components would unfold simultaneously. This would replicate the (reversed) preferences for loss-outcome risks observed in Study 3 while also showing for the first time that the process (simultaneous or sequential) moderation (Studies 4a and b) also applies to loss-outcome framed multicomponent risks.

Figure 8
Willingness to Pay (WTP) for the Lottery, by Components (Dice) and Reveal (Study 5)



Note. In the *immediate* reveal condition, the outcome of a die roll would be revealed before the next die was thrown. In the *delayed* reveal condition, the outcome of the die rolls would not be revealed until all dice were thrown. All predicted log-transformed means were backtransformed, so they appear on the original scale.

Second, we measured anticipated confidence and anticipated anxiety. We expected that people would anticipate feeling more confidence when proceeding through a spread risk, especially when the components would unfold sequentially. Furthermore, we expected that this would explain the interest in spreading disjunctive risks. This would replicate evidence for the key role of anticipated experience in multicomponent risk preferences (Studies 1 and 3) while permitting a more direct test that myopic evaluations of anticipated experience explain why preferences for spreading (vs. consolidating) are strongest when those components will play out across time (as observed in Studies 4a–5).

Third, we had participants estimate the probability that the risk would result in a failure. This would allow us to directly test whether anticipated experience would explain participants' multicomponent risk preferences, independent of participants' beliefs about the likelihood of failure (or success). Fourth, although we again used the die-game paradigm used in Studies 4a–5, we no longer asked participants to report how much they would pay to play the game. Instead, we provided participants with a price for each version and asked them whether they would want to play each one. This change served merely to assess the robustness of our results.

Method

Participants and Design

A total of 1,015 Americans were recruited from AMT using the CloudResearch platform. Each participant was randomly assigned to one of two *process* conditions (*simultaneous* or *sequential*). We also used a memory-based attention check to screen out 12 participants who could not remember details of the game they observed. The analyses below use only the 1,003 participants who correctly answered this attention check question.

Procedure

All participants first learned that they would play 10 rounds of a simple gambling game. In each round, participants would receive a number of dice (either 2, 3, 4, 5, or 6). Each die was unique in that it possessed a different color. These mixed lotteries were a subset of those used in Study 4b, except instead of being described as conjunctive risks that could lead to a specified gain, they were framed as disjunctive risks that could lead to a loss (of the cost to play the game—i.e., the dice fee). With a reduced set of (only 10) lotteries, each offered one of two objective probabilities for losing. For each lottery, participants received information about which numbers were acceptable and which were forbidden. The instructions emphasized that participants would lose their dice fee (and not receive $50) if they rolled at least one forbidden number.

Depending on participants' process condition, they learned that they would roll the dice one at a time (*sequential* condition) or all at once (*simultaneous* condition). When the dice were to be rolled in sequence, the outcome of each die would be revealed right away. Participants considered the 10 lotteries three times (i.e., across three blocks): to indicate whether they would play the lottery at a specified price, to estimate their anticipated experience while proceeding through the risk, and to estimate the probability that they would roll at least one forbidden number. We counterbalanced across participants which of the first two measures participants considered first. Within each block, the order of the 10 lotteries was randomized.

Interest in the Multicomponent Risk. For each risk, participants were told the dice fee and asked whether they would want to purchase the dice at that price. Each dice fee was the average amount—as identified in a pilot study—that participants indicated being willing to pay to play that particular lottery (under the condition that the dice would be rolled simultaneously). Participants indicated their interest in each lottery via one of four options: (1) definitely no, (2) learn no, (3) lean yes, and (4) definitely yes.

Anticipated Experience. Participants reported how much anxiety and confidence they anticipated experiencing were they to actually play the game as described. These items were completed on 101-point slider scales anchored at 0 (*not at all*) and 100 (*very confident/anxious*). The slider always started at 50, though the precise value to which participants adjusted was not visible to them. We counterbalanced the order of these two items.

Estimated Probability. Participants estimated the probability that they would indeed suffer a loss. More specifically, for each lottery, participants saw, "How likely do you think it is that a forbidden number would appear on at least one of the dice?" Responses were offered in an open-ended textbox. To proceed, participants had to offer a percentage between 0% and 100%, inclusive.

Results and Discussion

Interest in Multicomponent Risk

We first examined participants' willingness to play the dice games at the specified prices. We predicted participants' interest using a mixed model. It included fixed effects of *dice* (coded from −2 to +2), objective win *probability* (−1 or +1), and *process* (−1 = sequential and +1 = simultaneous). To account for the nonindependence of participants' 10 responses, we included a random effect of participant.

We observed a positive effect for number of dice, $B = 0.094$, $SE = 0.005$, $t(9021) = 17.85$, $p < .001$. This reflects that participants preferred to spread loss-outcome disjunctive risks. Crucially, we also observed a Process × Dice Number interaction, $B = -0.019$, $SE = 0.005$, $t(9021) = 3.52$, $p < .001$. This conceptually replicates the patterns shown in Studies 4a–5: Participants' preference for spreading loss-outcome disjunctive risks was attenuated when the die rolls occurred simultaneously ($B = 0.076$) compared to sequentially ($B = 0.113$). This attenuated preference for spreading is consistent with a myopia account in which participants are swayed by the sort of news they would expect to receive at single moments in time.

Anticipated Experience and Estimated Probability

To further probe the nature of these multicomponent risk preferences, we used the same model outlined above to predict anticipated confidence, anticipated anxiety, and the estimated probability of losing. The Process × Dice interaction predicted each of these variables as well: anticipated confidence, $B = -0.516$, $SE = 0.137$, $t(9021) = 3.76$, $p < .001$; anticipated anxiety, $B = 0.440$, $SE = 0.125$, $t(9021) = 3.52$, $p < .001$; and estimated probability, $B = 0.457$, $SE = 0.108$, $t(9021) = 4.25$, $p < .001$. To probe whether participants' interest in the multicomponent risk might be (independently) explained by one or more of these variables, we added these three variables to the original model predicting interest in the multicomponent risk. Two of the three predictors explained unique variance.

The greater the probability participants thought there was of rolling a forbidden number, the less interest they displayed in accepting the risk, $B = -0.0077$, $SE = 0.0005$, $t(9661.76) = 16.68$, $p < .001$. But independently, the more participants thought they would proceed through the risk feeling confident, they showed increased interest in the risk, $B = 0.0107$, $SE = 0.0004$, $t(9594.91) = 23.85$, $p < .001$. As foreshadowed by the inconsistent role it has played in this article's reported effects, anticipated anxiety did not contribute incremental predictive power, $B = -0.0006$, $SE = 0.0005$, $t(8797.55) = 1.23$, $p = .218$. In this full model, the Process × Dice interaction halved in size to become only marginal significant, $B = -0.009$, $SE = 0.005$, $t(9010.47) = 1.89$, $p = .059$. This shows once again that anticipated experience—and anticipated confidence in particular—explains preferences for multicomponent risks and how they are actually played out, independent of the perceived probability of overall success or failure.[4] Full model output is provided in Table 2.

Summary

Study 6 replicated a finding from Study 3: People preferred to spread loss-outcome disjunctive risks. The present study used a different decision context and a new measure to capture interest in the multicomponent risk. Study 6 also went further by demonstrating—for the first time for a loss-outcome multicomponent risk—that the preference to spread (vs. consolidate) was attenuated when the distinct components would not play out across time. Furthermore, we saw the first demonstration that this pattern of moderation was itself explained by anticipated confidence, but not anticipated anxiety, even independent of participants' beliefs about the probability of ultimate failure or success. This is consistent with the myopia account that preferred risk structures allow one to be in a reasonably confident position at any single point in time as one would proceed through the risk. Participants seemed to take comfort when the likelihood of a loss at any single point in time was low, a myopic perspective that neglects just how many consecutive periods (i.e., die rolls) they would have to survive. Supplemental Study A replicated these findings—including the mediation through anticipated confidence but not anticipated anxiety, independent of estimated probability—using a paradigm that paralleled Study 4b (with gain-outcome conjunctive risks).

General Discussion

For all but the simplest endeavors, ultimate success depends on the degree of success with component tasks. In this article, we considered two extremes: when overall success requires at least one component's success (disjunctive risk) or every component's success (conjunctive risk). For people who are faced with disjunctive risks, their prospects for victory continually decline as they proceed

[4] Not only did anticipated confidence predict interest in the multicomponent risk independent of the estimated probability, but also the Process × Dice interaction predicted both anticipated confidence, $B = -0.36$, $SE = 0.13$, $t(9024.96) = 2.73$, $p = .006$, and interest in the multicomponent risk, $B = -0.013$, $SE = 0.005$, $t(9024.63) = 2.60$, $p = .009$, independently of the estimated probability as well.

Table 2
Regressions Predicting the Potential Mediators as Well as Participants' Interest in Playing the Dice Games (Study 6)

Predictors	Mediator: Anticipated confidence		Mediator: Anticipated anxiety		Mediator: Estimated probability		DV: Interest in dice game	
	B (*SE*)	*t*	*B* (*SE*)	*T*	*B* (*SE*)	*t*	*B* (*SE*)	*t*
Dice	2.5222 (0.1370)	18.41***	−0.8497 (0.1250)	−6.80***	−2.0714 (0.1076)	−19.26***	0.0511 (0.0051)	10.03***
Proc = Seq[a]	3.0378 (0.1895)	16.03***	−1.2896 (0.1730)	−7.46***	−2.5381 (0.1488)	−16.99***	0.0605 (0.0070)	8.64***
Proc = Sim[b]	2.0065 (0.1978)	10.14***	−0.4099 (0.1806)	−2.27*	−1.6148 (0.1553)	−10.40***	0.0418 (0.0072)	5.78***
Prob	2.2515 (0.1937)	11.62***	−1.2102 (0.1768)	−6.84***	−1.5035 (0.1521)	−9.89***	−0.0259 (0.0071)	−3.66***
Process	−2.1011 (0.5876)	−3.58***	1.7048 (0.6480)	2.63**	0.5586 (0.5772)	0.97	−0.0129 (0.0202)	−0.64
Dice × Prob	−0.0842 (0.1370)	−0.62	0.1310 (0.1250)	1.05	0.0632 (0.1076)	0.59	−0.0032 (0.0050)	−0.65
Dice × Proc	−0.5156 (0.1370)	−3.76***	0.4398 (0.1250)	3.52***	0.4567 (0.1076)	4.25***	−0.0094 (0.0050)	−1.89
Prob × Proc	−0.3950 (0.1937)	−2.04*	0.3435 (0.1768)	1.94	0.0070 (0.1521)	0.05	−0.0024 (0.0070)	−0.34
Dice × Prob × Proc	−0.0203 (0.1370)	−0.15	−0.0949 (0.1250)	−0.76	−0.0695 (0.1076)	−0.65	0.0060 (0.0050)	1.20
Anticipated confidence							0.0107 (0.0005)	23.85***
Anticipated anxiety							−0.0006 (0.0005)	−1.23
Estimated probability							−0.0077 (0.0005)	−16.68***

Note. Proc = process (coded as: sequential = −1 and simultaneous = +1), Prob = win probability (coded as −1 or +1), and Dice = number of dice (coded from −2 to +2). DV = dependent variable; *SE* = standard error.
[a] Simple effect of dice number in the sequential process condition. [b] Simple effect of dice number in the simultaneous process condition.
* $p < .05$. ** $p < .01$. *** $p < .001$.

without a single success. But for people confronted with conjunctive risks, as long as they "stay in the game," their prospects for ultimately succeeding go up.

We argued that people are myopic in their approach to multicomponent risk. Decisions to accept risks reflect not only beliefs that those risks will turn out well, but also the anticipated experience of proceeding through that risk. But anticipated experience reflects a certain myopia: People disproportionately focus on how they would feel at a single moment in time as they progress through an experience, thereby neglecting the implications offered by the number of opportunities (disjunctive risks) or potential hazards (conjunctive risks) they will face. When a multicomponent risk plays out sequentially across time, spreading or consolidating the risk across more or fewer components can permit myopic decision makers to proceed through the risk with more anticipated confidence—more certain that the next news they get will be good (or at least not bad). But such preferences reflect an underappreciation of the importance of the total number of components to survive (or opportunities for success).

Across seven studies and three contexts, we found that risk-takers prefer to spread or consolidate equiprobable multicomponent risks when the criteria for ultimate success requires the success of each component (conjunctive) or at least one component (disjunctive), respectively. These effects held regardless of whether participants were explicitly told that spreading or consolidating would have no implications for the likelihood of overall success, when preferences for multicomponent risks were compared against preferences for single-component risks believed to offer the same likelihood of success, or even when once we measured and statistically controlled for these probability beliefs. Anticipated confidence consistently mediated these preferences. Such anticipated confidence was assessed myopically. This myopia did not simply reflect a focus on individual components of the multicomponent risk, but individual moments when feedback would be received. As a result, when feedback about all components would be revealed at once, the preferences to consolidate or spread multicomponent risks attenuated.

Although we have focused on developing and testing whether a narrow, myopic perspective can explain multicomponent risk preferences, we do wish to redraw attention to a second factor that likely influences these preferences: anchoring on the probability of a single component's success and simply not knowing how far to adjust (and thus adjusting insufficiently) to arrive at the perceived likelihood of overall success. The present research did not set out to directly test this account, but rather the *insufficiency* of accounts that rest on such probability misestimation. That said, several aspects of our findings suggest an additional role for anchoring-like accounts. First, when participants offered their beliefs about how likely multicomponent risks were to yield successes, they showed biased estimates that were consistent with anchoring-guided reasoning (Studies 2, 3, and 6). Second, even when outcomes were to be revealed simultaneously, we typically (Studies 4a, 4b, and 6), but not always (Study 5), saw continued preference for spreading or consolidating risks in a way the anchoring account would anticipate. These findings are consistent with, even if they do not strictly necessitate, the anchoring-and-adjustment account.

But more crucially, five aspects of our findings can be anticipated only by our myopia account, with its focus on narrowly constructed experiential forecasts. First, we found that people preferred to consolidate disjunctive risks and spread conjunctive risks even when these possibilities were described qualitatively, thus not giving participants a component probability on which to anchor (Study 1). Second, we found that people preferred to consolidate or spread multicomponent risks compared to matched single-component risks that were themselves characterized by probabilities of success that already incorporated any anchoring-related biases that might have been distorting perceptions of the multicomponent risks (Study 2). Third, we found preferences for consolidating and spreading multicomponent risks even when statistically controlling for participants' beliefs about those risks' likelihood of overall success (Studies 3 and 6). Fourth, we found that preferences for multicomponent risks were predicted by anticipated confidence, even when the probabilities of overall success were explicitly or statistically equated (Studies 1, 3, and 6). Fifth, when the time course over which the success of each component would be played out or revealed was varied—thus altering the one-to-one alignment between each individual component's probability of positive resolution and what news would be learned at a single point in time—preferences predictably shifted (Studies 4a–6), an effect that was itself explained by myopic evaluations of anticipated confidence (Study 6).

One question is whether these myopic preferences are misguided (i.e., reflective of a bias). Studies 4a–6 found that people reported being willing to pay a monetary price to achieve their desired risk structure, absent any benefit in terms of greater objective or subjective probability of success. We also conducted incentive-compatible Supplemental Study B, in which some participants (managers) decided whether they wanted to tie their own monetary fortunes to a player who was facing an anagram game that took the form of a spread or consolidated conjunctive or disjunctive risk. Managers showed a familiar pattern, preferring that the player face a spread risk when it took a conjunctive form and a consolidated risk when it took a disjunctive form. Players' actual performance suggested the managers' choices were unwise.

In other words, in moving from multicomponent risks whose results are governed by purely stochastic processes (e.g., die rolls) to those that are products of human efforts (e.g., puzzle solving), it is not simply that there is a hidden wisdom in people's preferences that the cold rules of probability fail to anticipate. That said, there is a more nuanced question of whether paying such a cost is *actually* worth it. After all, participants in Study 6 were likely not wrong when they reported anticipating that they would proceed through a loss-outcome disjunctive risk—spread across time and components—with more confidence. Furthermore, these participants' preferences—as indexed by their willingness to accept gambles at specified prices—were explained by this anticipated confidence above and beyond their subjective likelihood of ultimate success. Whether people are fully rationally clear-eyed about their willingness to trade-off monetary winnings for a certain risk structure is a question that could be more carefully examined in future research.

A second remaining question is why we found clear support for anticipated confidence explaining multicomponent risk preferences, but almost no support for anticipated anxiety doing the same. It was not that *anticipatory* (instead of anticipated) anxiety offered more predictive power (Study 3). Furthermore, most of our studies examined mixed gambles, those that offered the chance of an absolute win or an absolute loss. If anticipated confidence was determinative when risk-takers consider possible gains and anticipated anxiety had been determinative when risk-takers consider potential losses, then these contexts—especially when reframed in loss-outcome terms—should have offered a good chance for anticipated anxiety to play a mediating role. No such support was found. That said, future research might find that by examining multicomponent risks that only offer prospects for losses, anticipated anxiety might play a more influential role.

Comparison With Related Work

Myopia

Consider further how the present research offers a somewhat different take on myopia than do related examinations. Thaler et al. (1997) studied *myopic loss aversion.* In their paradigm, participants were more likely to take a higher risk, higher reward gamble if they would learn the final outcome only after every 40 periods of play as opposed to after each period. Through such aggregation, participants could avoid the unpleasant shocks of learning about every individual loss (Gneezy & Potters, 1997; Haigh & List, 2005; Hardin & Looney, 2012; Langer & Weber, 2005). Preferences were myopic in the sense that they entailed hypersensitivity to the prospects of short-term fluctuations even though such shocks would be watered down in the aggregate. Keeping risk-takers in the dark about the see-sawing pattern of payoffs allowed them to tolerate more risk overall. Any reader who has become transfixed (and stressed) by checking daily their retirement account balance can appreciate the folly of this approach.

The present article's appeal to myopia both shares and diverges from this perspective. For us, myopia did not involve real-time tracking of independently realized wins and losses. We considered risks whose payoffs were not merely the sum of their component parts'. Instead, we used myopia to describe people as narrowly responsive to the prospects for good or bad news for a single part of the task, thereby (at least relatively) neglecting the overall chances that the risk would turn out well. Thus, whereas Thaler et al. would suggest that people would be more likely to take a repeated risk if they would receive less feedback, our own account (and data) find that people prefer (conjunctive) risks that offer more periods of feedback (because this allows them to diminish the chances of bad news in each). That said, what unites these examples as evidence of myopia is they both entail people being disproportionately swayed by local prospects while neglecting the more global picture.

Time

When psychologists consider the influence of time, they are typically interested in a delay between the present and when an outcome will be realized. For example, there has been considerable investigation of how future payoffs are discounted to be valued in the present (Frederick et al., 2002). Other work drawing on construal level theory makes the case that choices and options in the future are represented more abstractly than those that will be realized in the present (Liberman & Trope, 1998; Liberman et al., 2002; Sagristano et al., 2002; Trope & Liberman, 2003, 2010). The present article highlights the importance of temporal separations that relate to the time course over which information is learned. Such separations lead risks to be resolved across time, which allows myopia to distort anticipated experience and color preferences. It is notable that this myopia operates even under the sort of constrained timescales considered in the present work: People confronted with disjunctive risks prefer to rip the (smaller number of) band-aids off all at once, whereas those faced with conjunctive risks would rather keep prodding along (by valuing risks that require inching toward success), even when those multiple steps occur back-to-back.

The present examination of time is most similar in form to work by Budescu and Fischer (2001). They showed that people prefer that a multicomponent risk unfold in an evenly spaced manner (e.g., a coin flip every 30 s) as opposed to an asymmetrically spaced one (e.g., a coin flip after 50 s, another after 30 s, and another after 10 s; or the reverse sequencing). To Budescu and Fischer (2001), this reflected a preference for symmetric, simple processes; the asymmetrically spaced tosses included a needlessly complicating feature. But for the present work, our own interest in the time course of multicomponent risks does not lie in the process's aesthetic properties, but instead in its ability to segregate or integrate experiences, thereby changing the prospects for good or bad news in a single period (see also Kovářík et al., 2016). Both demonstrations reflect violations of the reducibility principle that rational decision makers should be indifferent between prospects that have identical outcomes and probabilities. Such violations have been observed before (Kahneman & Tversky, 1979; O'Donnell & Evers, 2019; Slovic, 1995), even as they take a new form in the present research.

Limitations and Future Directions

When multicomponent risks unfold in the real world, they may differ from those in the presently used paradigms in several ways. One is that it is likely more common that people do not have a priori access to the actual probabilities of each component succeeding. In that sense, Studies 2–6, which supplied participants with these probabilities, may be somewhat exceptional. That said, it is reassuring that in Study 1 (as well as Supplemental Study B), in which such probabilities were not explicitly provided (but the dependency between spreading and consolidating and the component probabilities of success was stated or could be logically inferred), we found support for our hypotheses.

A second is that in many real-world contexts, the probability of each component success is not independent, especially when the components play out sequentially. Consider the entrepreneur in Study 1 who faced a disjunctive risk—that is, a need for just one investor. In reality, she might benefit from approaching a large number of low-probability investors, using the feedback from one failed pitch to inform the next. Although this would not have produced hypothesis-consistent results, this issue highlights that the nonindependence of components can make it tricky to identify the effect that consolidating or spreading sometimes has on actual probabilities of success.

This concern helps to put in perspective two strengths of our designs. For one, in Supplemental Study B, we actually measured players' game performance under different structures. Players did not excel when managers expected them to. This suggests it was not the case that participants were simply attuned to ways that spreading or consolidating risks actually changed the overall probabilities of success. At the same time, this does not suggest that there are not other situations in which such managers' patterns of preferences would be wise. Second, these considerations bring into focus the strengths of the die-rolling paradigms. Despite offering a stripped-down procedure that lacks certain features of real-life multicomponent risks, the die-rolling paradigm also provided full visibility into the nature of the confronted risk (e.g., the objective probabilities of individual subcomponents' outcomes and the statistical independence of each component regardless of the time course), both of which permitted clean tests of our accounts.

A third issue is there may also be a limit to just how far people prefer to spread conjunctive risks. Other than in Study 1 (when the number of components was unspecified), we examined preferences for spreading among two to six components. But at some point, the psychological benefits from spreading conjunctive risks (in terms of the myopically valued increased chance of winning on the next revealed component) will begin to diminish. This suggests that the gains from additional spreading may eventually be offset by the negative of expanding to more components one must successfully weather. Future research may model determinants of those conjunctive risk-takers' optimal degree of spreading, not their unconditional preference for it.

A fourth issue relates to direct experience with the risks. To be sure, our participants had a lifetime of experience with rolling dice, but even in those paradigms the specific multicomponent risks they considered were likely novel. How might the preference for consolidating disjunctive risks and spreading conjunctive risks change with experience? One possibility is that participants' subjective probability estimates might improve (Johnson & Bruce, 2001). If so, this might suggest that experienced decision makers would show less of the presently documented effects. After all, experience has been shown to teach decision makers to avoid narrow choice bracketing when broad choice bracketing is more appropriate (Hong & Sternthal, 2010; Huang & Hutchinson, 2013). That said, even if such probability judgments improve, our research consistently found that preferences for consolidating and spreading cannot simply be reduced to probability misestimation. Keep in mind that by spreading conjunctive risks across more components and more time, it actually *is* the case that these risk-takers would consistently face a relatively high probability of success for the next period. With a myopic perspective, risk-takers should typically be feeling reasonably confident and will be rewarded with a mini (single-component) victory a relatively larger percentage of the time. Furthermore, each successful component should raise people's hopes as they get closer and closer toward the end prize (Strickland & Grote, 1967). Such repeated confidence boosters might be even more impactful upon actual experience than they are in prospect.

Finally, we should emphasize that all of our studies were completed on American samples—either workers recruited from AMT or undergraduates taking an introductory course. On the one hand, the diversity of AMT's worker pool suggests that we tested for systematic preferences concerning multicomponent risks by drawing on a broad population. That said, we appreciate that drawing on participants from other cultural contexts would be necessary before we can label the patterns identified herein as something of a universal. For example, some evidence exists that Westerners show greater evidence of delay discounting (Kim et al., 2012) and impatience (Chen et al., 2005)—both markers of myopia—than do Easterners. Of course, those forms of myopia take a slightly different from, reflecting a hypervaluation of the present instead of a tendency to adopt a narrow focus in evaluating a global, complex prospect. Myopia that only emphasizes immediate rewards would have, for example, predicted only a preference for quickly realized lotteries, not a preference for multicomponent risks that would be revealed more slowly over time (Studies 4b and 6).

Conclusion

Psychologists have long been interested in how people approach risk. Typically, such work has examined single-component risks—individual events with uncertain outcomes that resolve in a positive or negative way. But in the real world, many if not most risks are actually multicomponent risks. People end up succeeding or failing not merely because of the outcome of a single event in isolation, but based on how multiple events play out. People prefer to consolidate disjunctive risks and spread conjunctive risks in part because such risk structures maximize one's prospects for good news at a single point in time, even if not for the risk as a whole. Our appeal to this myopia allowed us to make novel predictions about how, when, and why people prefer multicomponent risks be structured in different ways. We hope that this work encourages future explorations of other decision-making phenomena that may also result from locally positive, confidence-inspiring evaluations masking more lackluster global prospects.

References

Bar-Hillel, M. (1973). On the subjective probability of compound events. *Organizational Behavior and Human Performance*, *9*(3), 396–406. https://doi.org/10.1016/0030-5073(73)90061-5

Benartzi, S., & Thaler, R. H. (1995). Myopic loss aversion and the equity premium puzzle. *The Quarterly Journal of Economics*, *110*(1), 73–92. https://doi.org/10.2307/2118511

Budescu, D. V., & Fischer, I. (2001). The same but different: An empirical investigation of the reducibility principle. *Journal of Behavioral Decision Making*, *14*(3), 187–206. https://doi.org/10.1002/bdm.372

Carrera, P., Caballero, A., & Muñoz, D. (2012). Future-oriented emotions in the prediction of binge-drinking intention and expectation: The role of anticipated and anticipatory emotions. *Scandinavian Journal of Psychology*, *53*(3), 273–279. https://doi.org/10.1111/j.1467-9450.2012.00948.x

Chen, H., Ng, S., & Rao, A. R. (2005). Cultural differences in consumer impatience. *Journal of Marketing Research*, *42*(3), 291–301. https://doi.org/10.1509/jmkr.2005.42.3.291

Cohen, J., Chesnick, E. I., & Haran, D. (1972). A confirmation of the INERTIAL-ψ effect in sequential choice and decision. *British Journal of Psychology*, *63*(1), 41–46. https://doi.org/10.1111/j.2044-8295.1972.tb02082.x

Frederick, S., Loewenstein, G., & O'Donoghue, T. (2002). Time discounting and time preference: A critical review. *Journal of Economic Literature*, *40*(2), 351–401. https://doi.org/10.1257/jel.40.2.351

Gal, D., & Rucker, D. D. (2021). Act boldly: Important life decisions, courage, and the motivated pursuit of risk. *Journal of Personality and Social Psychology*, *120*(6), 1607–1620. https://doi.org/10.1037/pspi0000329

Gigerenzer, G., & Garcia-Retamero, R. (2017). Cassandra's regret: The psychology of not wanting to know. *Psychological Review*, *124*(2), 179–196. https://doi.org/10.1037/rev0000055

Gneezy, U. (1996). Probability judgments in multi-stage problems: Experimental evidence of systematic biases. *Acta Psychologica*, *93*(1), 59–68. https://doi.org/10.1016/0001-6918(96)00020-0

Gneezy, U., & Potters, J. (1997). An experiment on risk taking and evaluation periods. *The Quarterly Journal of Economics*, *112*(2), 631–645. https://doi.org/10.1162/003355397555217

Haigh, M. S., & List, J. A. (2005). Do professional traders exhibit myopic loss aversion? An experimental analysis. *The Journal of Finance*, *60*(1), 523–534. https://doi.org/10.1111/j.1540-6261.2005.00737.x

Hardin, A. M., & Looney, C. A. (2012). Myopic loss aversion: Demystifying the key factors influencing decision problem framing. *Organizational Behavior and Human Decision Processes*, *117*(2), 311–331. https://doi.org/10.1016/j.obhdp.2011.11.005

Harris, C. R. (2012). Feelings of dread and intertemporal choice. *Journal of Behavioral Decision Making*, *25*(1), 13–28. https://doi.org/10.1002/bdm.709

Hayes, A. F. (2017). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach*. Guilford Press.

Hoch, S. J., & Loewenstein, G. F. (1991). Time-inconsistent preferences and consumer self-control. *The Journal of Consumer Research*, *17*(4), 492–507. https://doi.org/10.1086/208573

Holtgraves, T., & Skeel, J. (1992). Cognitive biases in playing the lottery: Estimating the odds and choosing the numbers. *Journal of Applied Social Psychology*, *22*(12), 934–952. https://doi.org/10.1111/j.1559-1816.1992.tb00935.x

Hong, J., & Sternthal, B. (2010). The effects of consumer prior knowledge and processing strategies on judgments. *Journal of Marketing Research*, *47*(2), 301–311. https://doi.org/10.1509/jmkr.47.2.301

Huang, Y., & Hutchinson, J. W. (2013). The roles of planning, learning, and mental models in repeated dynamic decision making. *Organizational Behavior and Human Decision Processes*, *122*(2), 163–176. https://doi.org/10.1016/j.obhdp.2013.07.001

Johnson, J. E. V., & Bruce, A. C. (2001). Calibration of subjective probability judgments in a naturalistic setting. *Organizational Behavior and Human Decision Processes*, *85*(2), 265–290. https://doi.org/10.1006/obhd.2000.2949

Kahneman, D. (2000). Experienced utility and objective happiness: A moment-based approach. In D. Kahneman & A. Tversky (Eds.), *Choices, values and frames* (pp. 673–692). Cambridge University Press. https://doi.org/10.1017/CBO9780511803475.038

Kahneman, D., Fredrickson, B. L., Schreiber, C. A., & Redelmeier, D. A. (1993). When more pain is preferred to less: Adding a better end. *Psychological Science*, *4*(6), 401–405. https://doi.org/10.1111/j.1467-9280.1993.tb00589.x

Kahneman, D., & Lovallo, D. (1993). Timid choices and bold forecasts: A cognitive perspective on risk taking. *Management Science*, *39*(1), 17–31. https://doi.org/10.1287/mnsc.39.1.17

Kahneman, D., & Tversky, A. (1979). Prospect theory: An analysis of decision under risk. *Econometrica*, *47*(2), 263–291. https://doi.org/10.2307/1914185

Kim, B., Sung, Y. S., & McClure, S. M. (2012). The neural basis of cultural differences in delay discounting. *Philosophical Transactions of the Royal Society of London: Series B, Biological Sciences*, *367*(1589), 650–656. https://doi.org/10.1098/rstb.2011.0292

Kovářík, J., Levin, D., & Wang, T. (2016). Ellsberg paradox: Ambiguity and complexity aversions compared. *Journal of Risk and Uncertainty*, *52*(1), 47–64. https://doi.org/10.1007/s11166-016-9232-0

Langer, T., & Weber, M. (2005). Myopic prospect theory vs. myopic loss aversion: How general is the phenomenon? *Journal of Economic Behavior & Organization*, *56*(1), 25–38. https://doi.org/10.1016/j.jebo.2003.01.005

Liberman, N., Sagristano, M. D., & Trope, Y. (2002). The effect of temporal distance on level of mental construal. *Journal of Experimental Social Psychology*, *38*(6), 523–534. https://doi.org/10.1016/S0022-1031(02)00535-8

Liberman, N., & Trope, Y. (1998). The role of feasibility and desirability considerations in near and distant future decisions: A test of temporal construal theory. *Journal of Personality and Social Psychology*, *75*(1), 5–18. https://doi.org/10.1037/0022-3514.75.1.5

Linville, P. W., Fischer, G. W., & Fischhoff, B. (1993). AIDS risk perceptions and decision biases. In J. B. Pryor & G. D. Reeder (Eds.), *The social psychology of HIV infection* (pp. 5–38). Lawrence Erlbaum.

Loewenstein, G. (1987). Anticipation and the valuation of delayed consumption. *Economic Journal*, *97*(387), 666–684. https://doi.org/10.2307/2232929

Loewenstein, G. F., Weber, E. U., Hsee, C. K., & Welch, N. (2001). Risk as feelings. *Psychological Bulletin*, *127*(2), 267–286. https://doi.org/10.1037/0033-2909.127.2.267

Looney, C. A., & Hardin, A. M. (2020). Beyond myopia: Wealth accumulation mechanisms and evolving risk behaviors. *Decision*, *7*(2), 163–181. https://doi.org/10.1037/dec0000120

O'Donnell, M., & Evers, E. R. K. (2019). Preference reversals in willingness to pay and choice. *The Journal of Consumer Research*, *45*(6), 1315–1330. https://doi.org/10.1093/jcr/ucy052

Pope, R. (1983). The pre-outcome period and the utility of gambling. In B. P. Stigum & F. Wenstop (Eds.), *Foundations of utility and risk theory with applications* (pp. 137–177). Springer. https://doi.org/10.1007/978-94-017-1590-4_9

Read, D., Lowenstein, G., & Rabin, M. (1999). Choice bracketing. *Journal of Risk and Uncertainty*, *19*(1/3), 171–197. https://doi.org/10.1023/A:1007879411489

Redish, A. D., Jensen, S., & Johnson, A. (2008). A unified framework for addiction: Vulnerabilities in the decision process. *Behavioral and Brain Sciences*, *31*(4), 415–437. https://doi.org/10.1017/S0140525X0800472X

Ronen, J. (1973). Effects of some probability displays on choices. *Organizational Behavior and Human Performance*, *9*(1), 1–15. https://doi.org/10.1016/0030-5073(73)90032-9

Ruzek, N. A., Nguyen, D. Q., & Herzog, D. C. (2011). Acculturation, enculturation, psychological distress and help-seeking preferences among Asian American college students. *Asian American Journal of Psychology*, *2*(3), 181–196. https://doi.org/10.1037/a0024302

Sagristano, M. D., Trope, Y., & Liberman, N. (2002). Time-dependent gambling: Odds now, money later. *Journal of Experimental Psychology: General*, *131*(3), 364–376. https://doi.org/10.1037/0096-3445.131.3.364

Schlösser, T., Dunning, D., & Fetchenhauer, D. (2013). What a feeling: The role of immediate and anticipated emotions in risky decisions. *Journal of Behavioral Decision Making*, *26*(1), 13–30. https://doi.org/10.1002/bdm.757

Schreiber, C. A., & Kahneman, D. (2000). Determinants of the remembered utility of aversive sounds. *Journal of Experimental Psychology: General*, *129*(1), 27–42. https://doi.org/10.1037/0096-3445.129.1.27

Shafir, E. (1994). Uncertainty and the difficulty of thinking through disjunctions. *Cognition*, *50*(1–3), 403–430. https://doi.org/10.1016/0010-0277(94)90038-8

Simmons, J. P., Nelson, L. D., & Simonsohn, U. (2013, January). *Life after p-hacking* [Paper presentation]. 14th Annual Meeting of the Society for Personality and Social Psychology, New Orleans, LA, United States.

Slovic, P. (1969). Manipulating the attractiveness of a gamble without changing its expected value. *Journal of Experimental Psychology*, *79*(1), 139–145. https://doi.org/10.1037/h0026970

Slovic, P. (1995). The construction of preference. *American Psychologist*, *50*(5), 364–371. https://doi.org/10.1037/0003-066X.50.5.364

Slovic, P., Fischhoff, B., & Lichtenstein, S. (1978). Accident probabilities and seat belt usage: A psychological perspective. *Accident; Analysis and Prevention*, *10*(4), 281–285. https://doi.org/10.1016/0001-4575(78)90030-1

Strickland, L. H., & Grote, F. W. (1967). Temporal presentation of winning symbols and slot-machine playing. *Journal of Experimental Psychology*, *74*(1), 10–13. https://doi.org/10.1037/h0024511

Thaler, R. H., Tversky, A., Kahneman, D., & Schwartz, A. (1997). The effect of myopia and loss aversion on risk taking: An experimental test. *The Quarterly Journal of Economics*, *112*(2), 647–661. https://doi.org/10.1162/003355397555226

Trope, Y., & Liberman, N. (2003). Temporal construal. *Psychological Review*, *110*(3), 403–421. https://doi.org/10.1037/0033-295X.110.3.403

Trope, Y., & Liberman, N. (2010). Construal-level theory of psychological distance. *Psychological Review*, *117*(2), 440–463. https://doi.org/10.1037/a0018963

Tversky, A., & Shafir, E. (1992). The disjunction effect in choice under uncertainty. *Psychological Science*, *3*(5), 305–309. https://doi.org/10.1111/j.1467-9280.1992.tb00678.x

Walker, J., Risen, J. L., Gilovich, T., & Thaler, R. (2018). Sudden-death aversion: Avoiding superior options because they feel riskier. *Journal of Personality and Social Psychology*, *115*(3), 363–378. https://doi.org/10.1037/pspa0000106

Worthy, D. A., Otto, A. R., & Maddox, W. T. (2012). Working-memory load and temporal myopia in dynamic decision making. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *38*(6), 1640–1658. https://doi.org/10.1037/a0028146

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